CASSELL'S
PEOPLE'S PHYSICIAN

A BOOK OF MEDICINE
AND OF HEALTH
FOR EVERYBODY

IN FIVE VOLUMES

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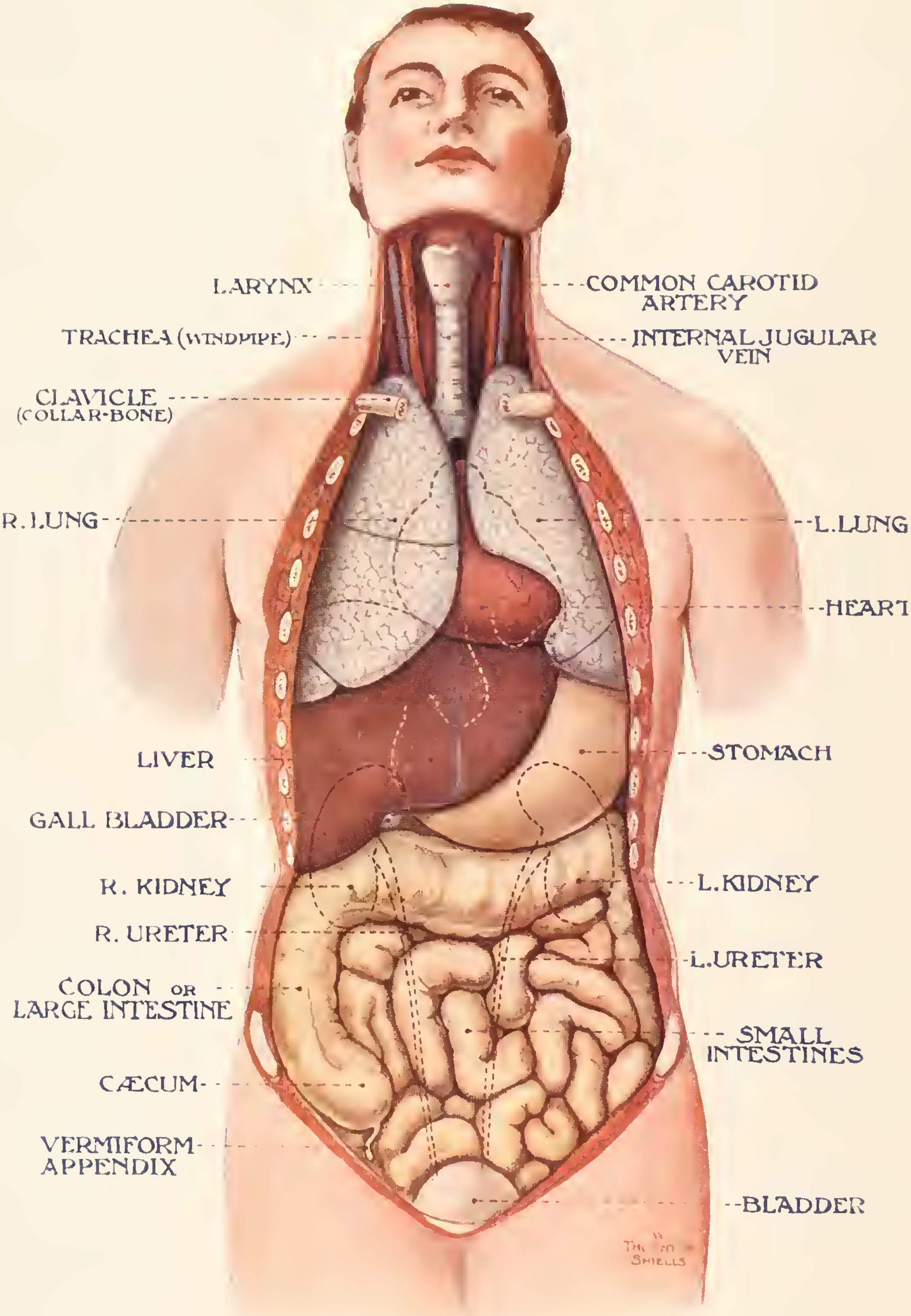

THE CHIEF ORGANS OF THE HUMAN BODY.

Cassell's
People's Physician

A Book of Medicine and of Health
for Everybody

Illustrated with Coloured and Black-and-White Plates
and with Figures in the Text

IN FIVE VOLUMES

VOL II

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THE PEOPLE'S PHYSICIAN

PART I (*continued*)

DISEASES: THEIR CAUSES, SYMPTOMS, AND TREATMENT

CHAPTER XIX

THE SKIN AND ITS FUNCTIONS

Functions of the Skin—Its Structure—Epidermis—Derma—Sweat Glands—Sebaceous Glands—Hair—Nails.

Functions of the Skin.

THE skin forms a complete covering for the outer surface of the body, and is directly continuous with the mucous membrane at the various orifices. By virtue of its toughness, flexibility, and elasticity, it is eminently fitted for its various duties, which include the defending of the internal parts from external violence, at the same time that it has to adapt itself to the various movements and changes of position. The skin also serves as the principal organ of the sense of touch, for which purpose it is provided with an abundant supply of sensitive nerve fibres and an elaborate array of minute structures which are specially set apart for the development of this sense. The skin, further, has to perform important duties connected with the removal of impurities from the body, which are carried off in water in the form of perspiration. It may also be called upon to absorb substances from its surface, and its power to do so is sometimes made use of in the treatment of disease; but in this respect it takes a position quite secondary to the organs of digestion. Besides water, the skin excretes an oily material through a number of minute glands, the purposes of which are to keep its surface moist and supple, to hinder evaporation from its surface, and to guard the skin from the effects of the long-continued action of moisture. Lastly, it fulfils a most important duty in regulating the temperature of the body, by its power of controlling the loss of heat from the organism over its whole surface.

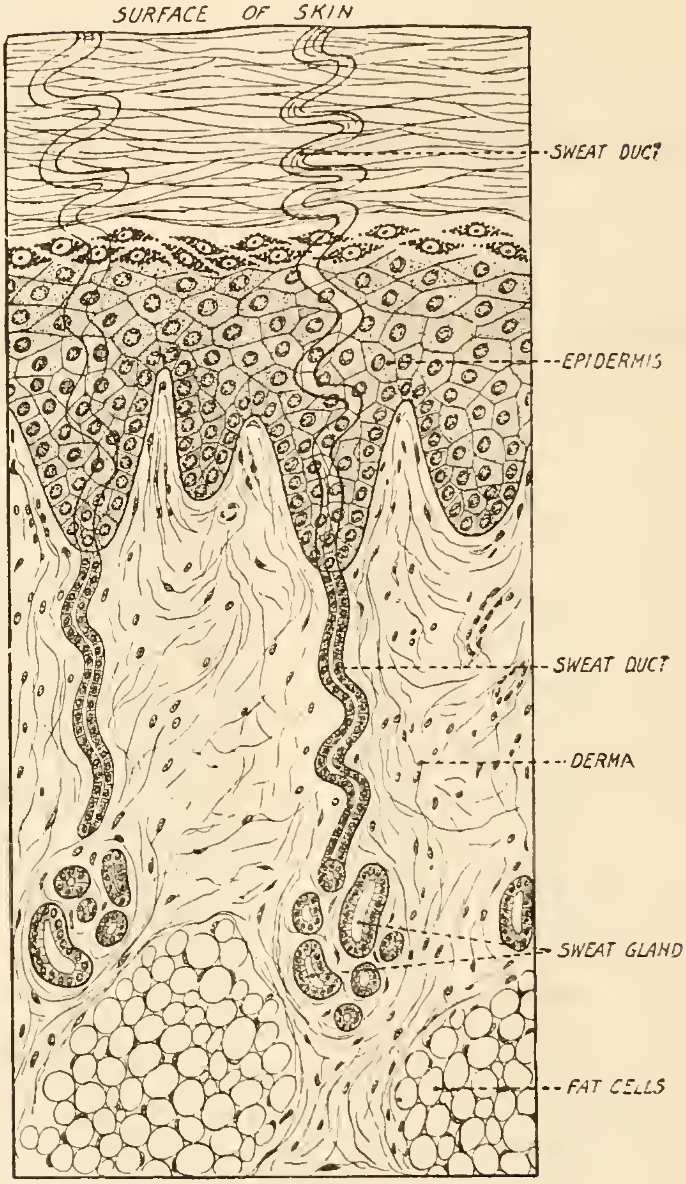


Fig. 40.—Highly magnified Section of Skin.

Structure. The skin is divided into two layers, the outer or scarf skin, called the epidermis or cuticle, and the inner or true skin, termed the derma or corium (Fig. 40).

The epidermis is made up of many layers of cells, and is the part raised by a blister. It is $\frac{1}{240}$ inch in thickness on the protected parts, but is ten times as thick, and is dense and tough, in the parts exposed to wear and tear, such as the palms of the hands and the soles of the feet. The deepest row of cells, which rests upon the true skin, consists of rounded cells, each containing small granules of pigment.

Epidermis.

Upon the amount of this colouring matter the tint of the skin depends, the white complexion of the European, the yellow of the Asiatic, the black of the African, and the brown of the American being entirely dependent for their varying tints upon these little makers of colouring matter. Exposure to sunlight stimulates them to greater energy; they make more pigment, and so the condition of "tan" or "sunburn" is produced, or, if it is formed in patches, of freckles. The cells of this deepest row are the direct progeny of the layer above them, and they are formed by a process of "budding," or pinching off a part of the parent bodies. The new cells gradually produce a new layer in a similar manner, the latest arrivals always taking their place next the true skin and pushing the older rows nearer to the surface. As the rows of cells grow older they become dry, shrivelled, and flattened, and finally, when they reach the surface, they are detached in the form of scurf by the friction of the underclothing or of a towel. The whole surface of our bodies is in this way constantly dying and being rubbed away.

No nerves nor blood-vessels enter the epidermis, and it can be removed without pain or hæmorrhage, and yet it is of great importance in the healing of wounds. If a large portion is removed, the process of repair is slow, and proceeds only from the edges of the wound, for it is only epidermis cells that can form new epidermis. This fact is made use of in practice by what is called "skin-grafting," which consists in taking small portions of skin from other parts of the body and laying them on the raw surface, where they take root and form foci of new growth, rapidly covering over and healing the wound. The epidermis forms a protective covering for the sensitive true skin, upon which it is accurately moulded, and if a portion of it is detached its under surface is found to present an impression of the ridges and furrows on the surface of the dermis. Various growths or appendages are developed from the epidermis, such as nails and hairs in man, and feathers, horns, hoofs, and bristles in lower animals.

Derma.

The true skin is supplied freely with many blood-vessels and nerves, and any injury to it causes both pain and hæmorrhage. It consists of an interlacing network of fine fibres, the meshes of which are largest at the deepest part, and are filled with fat. On its surface it is thrown into furrows, the largest of which are placed at the joints, while the finer furrows are present on the backs of the hands. The palms and soles are covered with enormous numbers of minute furrows and ridges, which are formed into patterns peculiar to each individual, and which do not change from infancy to old age. So characteristic are these patterns that they are made use of by the police in the identification of criminals. The ridges are formed by an array of minute elevations of the surface of the true skin, called papillæ, which are extremely sensitive, and are present in greatest number in the parts where the sense of touch is most acute, such as the palms of the hands and the fingers. It is by means of these minute " feelers " that the true skin becomes the organ of touch, and there are probably special nerves for the perception of heat and cold. The sensation of touch gradually merges into the sense of pain if the pressure applied to the part becomes excessive, and the sensation of touch also becomes that of pain when the protecting epidermis is removed and the true skin is exposed, as in the raw surface of a graze. In some parts of the skin, as the tip of the tongue or of the forefinger, the sense of touch is more highly developed than in others, those parts which have great sensibility being provided with complicated little structures in which the nerves end. One variety of these, called " end bulbs," is to be found in the lips, the tongue, and the surface of the eye; another, called " touch corpuscles," is most numerous on the palm of the hand and the fingers, but is absent from most parts of the surface of the body; whilst a third variety, the " Pacinian corpuscles," is freely supplied to the palm of the hand, and is also found on some internal nerves.

The skin has in all parts minute openings by which the secretions of its glands are discharged upon the surface. These are the orifices of the little ducts, and the idea that they lead into the interior of the body has given rise to the expression " opening the pores," to describe the body in a state of perspiration. But this condition is due to a great enlargement of the small blood-vessels of the skin, and has no connection with any opening of the ducts. During perspiration the glands are more active but the ducts are not more open.

Sweat Glands.

A sweat gland consists of a minute tube or duct which, starting from its orifice on the surface, passes through the epidermis and true skin, and is then coiled up in a small round mass in the soft fat beneath. Such glands are abundant over the whole surface of the body, but are most numerous where there is no hair, especially on the palm of the hand and the sole of the foot. In these situations it is estimated that there are 3,500 glands in a square inch, the number falling to 400 in the same area on the skin of the back, where they are least developed. Altogether the body is provided with about 2,380,000 of these small structures. The sweat is a colourless fluid, alkaline, and slightly salt to taste, and about 2½ lb. of it is daily discharged from the body. It carries off, mixed with water, much waste material, and the importance of this action is shown by the results if the sweat is suppressed. If an animal is covered all over with an impermeable varnish it will die, the heart and lungs being gorged with blood, and the temperature falling very low.

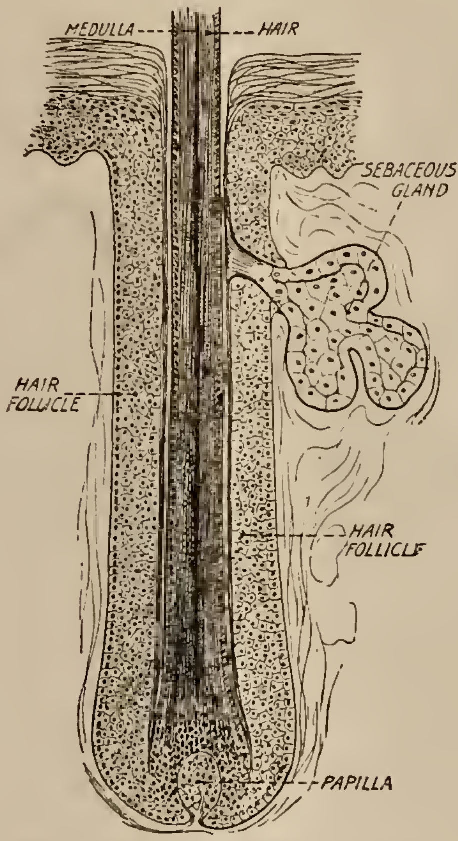


Fig. 41.—A Human Hair in its Sac.

The sebaceous glands are present principally in the parts supplied with hair, as the scalp and face. There are many, however, on the forehead and nose, but they are entirely absent from the palms and soles. Their ducts open on the surface of the skin or into the follicle of a hair, a very common arrangement being for two glands to be supplied to each hair.

Sebaceous Glands.

In the external ear passage are some small glands exactly similar in structure to these glands. They form a peculiar bitter, yellow wax, called cerumen, which protects the drum of the ear.

Hair.

In all parts of the body, except the palms and soles, the skin is provided with hairs. These grow from little depressions in the skin, called "follicles," the portion within being the hair bulb or root, that outside it the shaft (Fig. 41). It is in the follicle that the hair is produced and that all growth occurs. Hairs are composed of several layers, which are derived from both the epidermis and the true skin, and the structure of hair is so distinctive that that from a human body can be distinguished under the microscope from that derived from any other source, except from some apes. All nourishment to the hair is supplied from the blood-vessels of the true skin by a small projection called the papilla, on which the hair root is moulded. If you pull out a hair you can see its root as a little bulb at the extremity, with a certain number of loose cells adhering to it, which form part of the root-sheath. The rate of growth varies with the individual and the season of the year, and the average is estimated to be about 6 or 7 inches in a year. The colour of hair depends upon the quantity and variety of pigment which is formed in it, and upon the presence of air in minute spaces between the cells. In white hair these spaces are numerous, but in black hair they are almost wholly absent. As age advances, the cells which produce the hair at its root grow feeble, producing less pigment and more air-filled spaces.

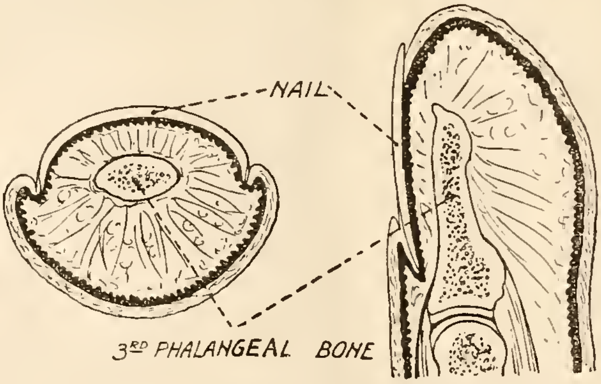


Fig. 42.—HORIZONTAL AND VERTICAL SECTIONS OF A NAIL.

In nails, growth occurs in two directions—at the root, or part covered by a fold of skin, which increases the length of the nail, and at the bed or under-surface, by which its uniform thickness is maintained (Fig. 42). The nails of the fingers grow at about the rate of three nails' length in the year, and the toe-nails at a much slower rate.

CHAPTER XX

DISORDERS OF THE SKIN

Causes of Skin Affections—How to Recognise Them—Classification according to the Character of the Eruption—Eczema—Sweat Rash—"Prickly Heat"—Herpes or Shingles—Erythema—Rose Rash—Chafing (Intertrigo)—Nettle Rash (Urticaria)—Purpura—Impetigo.

AFFECTIONS of the skin are of interest and importance for many reasons—first, because they are very common; secondly, because they are often a valuable aid in recognising the nature of internal maladies; and thirdly, because they so largely affect not only the health but also the comfort and happiness of those who suffer from them.

Causes.

The skin, forming the general covering of the body, is exposed to many forms of irritation by which disease is caused, and from which internal parts are quite free. But besides causes of disease from without, the skin is so intimately connected with all parts of the body that it is constantly affected in general or constitutional disorders. Eruptions occur in connection with gout, rheumatism, tuberculosis, and the infectious fevers. A healthy skin covers a healthy body, and a good complexion and a clear skin depend upon the satisfactory action of all the organs of the body.

Many eruptions are due to errors of digestion and to sluggish action of the liver or constipated bowels. Dietetic rashes are not uncommon, and those who suffer must be careful to regulate their diet accordingly and avoid such substances as experience proves to be injurious. Most fatty and sweet foods are harmful, and should be taken in moderation or altogether avoided. Beer, spirit, pork, game, highly flavoured dishes, pastry, and pickles are particularly liable to act injuriously upon the skin. Shell-fish and mushrooms are poisons to some persons, setting up acute attacks of "nettle rash."

Other affections are caused by disorders of the nervous system, such as shingles and an intense itching called pruritus.

Certain drugs, if taken in excessive doses, produce crops of spots, two that act most frequently in this way being iodide and bromide of potash. That which constitutes an excessive dose varies much in different persons.

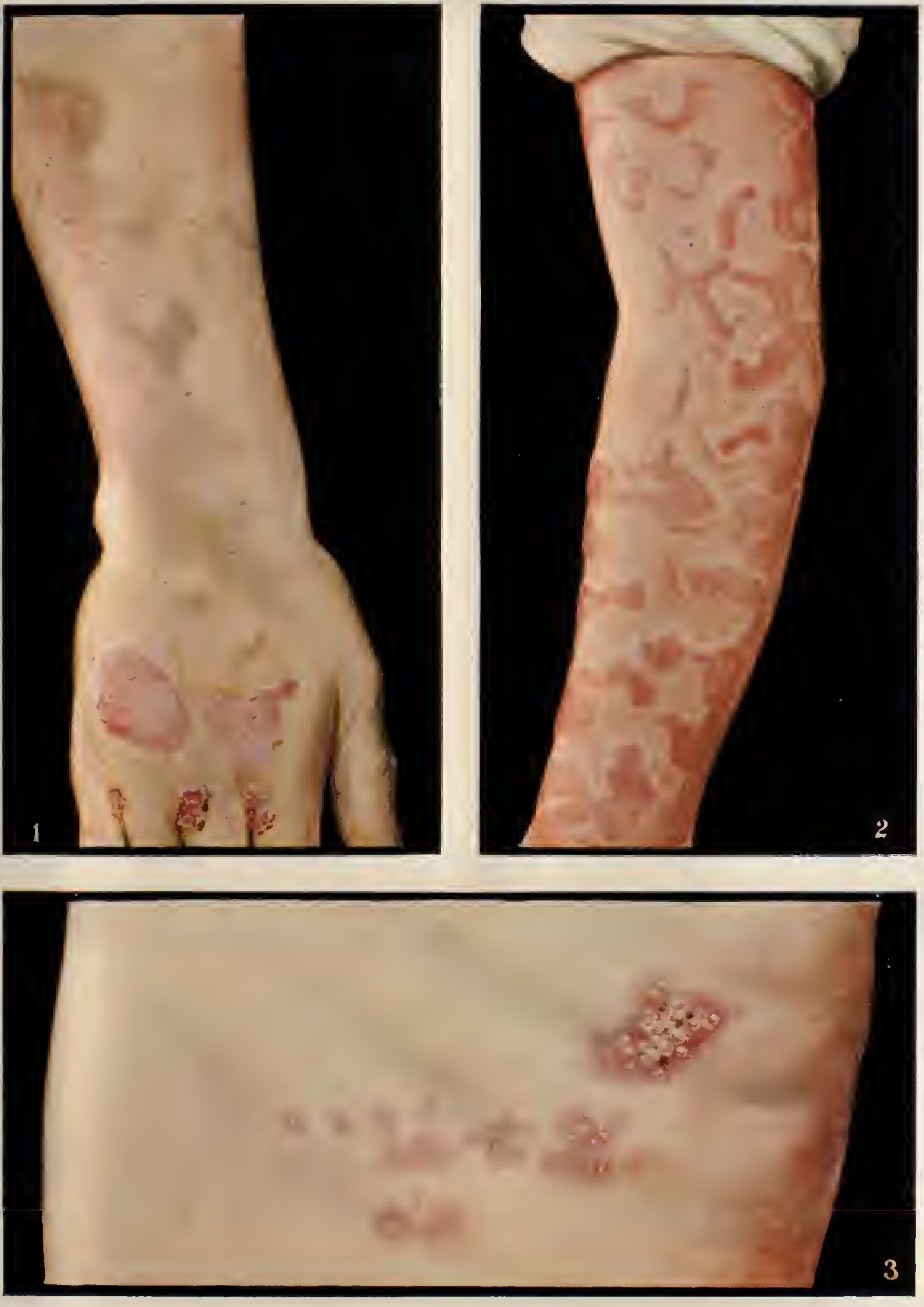
Of the external causes of skin disease, one of the most important, because of its frequency, is dirt. There is no difficulty in understanding that if the greasy secretions of the glands, mixed with dead cells of the epidermis and accumulated dust and dirt, are not cleaned off the skin regularly, the orifices of the glands will get blocked up, and the secretions will collect and produce spots and inflamed patches. Besides this, the accumulated dirt offers an attractive habitation to the animal parasites which are liable to attack the skin, and a fertile soil for the vegetable germs which are always ready to attach themselves to it. Many skin diseases are produced by these organisms. The itch insect, lice, bugs, and fleas all set up eruptions. Of vegetable parasites, of which there are many varieties belonging to the class of fungi, the most common is that which causes ringworm.

Want of cleanliness in the clothes also acts injuriously on the skin, garments next the skin, whether linen or woollen, if worn too long, becoming saturated with waste matters and producing irritation and rashes, besides encouraging the growth of parasites.

Contradictory though it sounds, washing may be a cause of skin affections if carried to excess or if improper materials are employed. Nature has provided oil-glands to keep the dermis smooth and soft, and if their secretion is removed too frequently or too energetically the skin becomes dry and brittle, scurfy and cracked. Even soap itself may cause, in a skin sufficiently sensitive, an unhealthy condition. This depends upon the amount of free alkali the soap contains, common soaps being the worst in this respect. Washing the face and hands just before going out of doors in raw weather is often followed by redness, tingling, and inflammation, which leads to "chapping" and chilblains.

The clothing may cause trouble even when perfectly clean; many skins cannot tolerate rough flannel next them, partly from the mechanical irritation of the rough material, and partly from the perspiration which it induces, for a moist skin is far more susceptible to injury than a dry one. Irritating and poisonous substances are sometimes present in clothing, either in dyes or as material used for cleaning purposes.

Being extensive, and much exposed to external conditions, the skin may be injured in many ways—by extremes of heat and cold, by the sun's rays, by the use of cosmetics, or by the repeated application of



COMMON SKIN DISEASES.

1. ECZEMA. 2, NETTLERASH (URTICARIA). 3, SHINGLES.

chemicals in certain occupations. Of chemicals, those used in dyeing and washing, antiseptics employed by nurses or for disinfection, and sugar used in cooking and sweet-making, are a few of the more common examples.

Recognition of Skin Affections.

It is often difficult to recognise the various affections to which the skin is liable, and yet it is important to do so in order to adopt the proper treatment. As it is our aim to make the recognition of these complaints as easy as possible, and as we propose only to describe those which are most commonly met with, we shall arrange the various eruptions according to the appearance of the spots which form them, dividing them into the following ten classes:—

1. *Watery spots.*—These have the appearance of little blisters, and are called vesicles. The fluid collects quite near the surface, under the epidermis, and at first is clear. They may break, and cause a watery discharge, forming light-coloured, thin scabs, or their contents may become thick, and they are then similar to those forming our fourth class. For this reason it is important to recognise their nature soon after their first appearance. In this class we shall place eczema, the sweat rash, and shingles.

2. *Spots of redness.*—These are the simplest form of spots, and are caused by an enlargement of the blood-vessels of the part. The spots are not raised above the surface of the surrounding skin; the redness vanishes on pressure of the finger, but rapidly returns when the finger is withdrawn. In this class are included some of the eruptions of the infectious fevers and erysipelas, but those we shall describe in this chapter are erythema, rose rash, intertrigo, and nettle rash.

3. *Blood spots.*—In the preceding class the redness is caused by blood in the vessels, which are enlarged and unnaturally full. If the blood escapes from the vessels owing to their being ruptured, it causes red spots also, but of a darker colour, and the redness does not disappear on pressure. These blood-spots occur in the skin disorder called purpura, and in scurvy, which is dealt with among diseases caused by food.

4. *Mattery spots.*—These are called pustules, and are distinguished from the spots of the first group by containing matter from their first appearance, and by being more deeply placed, for they are formed in the true skin, and not just under the epidermis. They are liable to burst and harden into large, thick scabs. Impetigo is the only eruption of this class that it will be necessary to notice.

5. *Pimples.*—Small spots which are raised above the surface of the surrounding skin, and can be felt with the finger. They are called papules, and are sometimes bright red from local enlargement of the blood-vessels, accompanied with swelling. The redness disappears if they are pressed by the finger, but the swelling remains. In this class we shall include prurigo, with pruritus. Red gum, which also belongs to it, is dealt with under Children's Diseases.

6. *Scales.*—These are formed by a separation of the superficial layers of the epidermis, which have become dry and loosened. The scales are opaque and white, and are popularly called scurf. Diseases of this class, styled squamous diseases, include pityriasis and psoriasis.

7. *Small Swellings.*—Small, hard elevations of the skin called tubercles, often as large as peas, or even larger. In this class we shall deal with lupus and acne.

8. *Pigment spots.*—These are called maculæ, and are due to the presence of too much or too little colouring matter in the parts of the skin affected. The spots are therefore either dark-coloured or white, and the eruptions they form are such trivial ones as freckles, sunburn, and moles.

9. *Spots formed by vegetable parasites.*—The diseases caused by vegetable parasites are barber's itch, liver spots, and ringworm.

10. *Spots formed by animal parasites.*—Under this heading we shall deal with the itch and pediculosis.

1. Eruptions formed of " Watery Spots " (Vesicles)

ECZEMA

Eczema may affect persons of all ages, from an infant in its cradle to a centenarian, and is one of the commonest of skin affections. It assumes an immense variety of forms in its different stages, and the description of an acute attack gives no idea of the chronic form. An enormous number of names have been found for it, but it is not necessary for us to know these so long as we can recognise the disease.

Causes. It may be set up by all forms of irritation of the skin, such as heat and cold, irritating soap, hard water, acrid discharges, lice or other parasites, rough underclothing, or dyed stockings. It is common in those who suffer from rheumatism, gout, or indigestion, and often follows nervous disturbances, such as fright, worry, or anxiety.

The complaint may involve all parts of the skin, but there are certain situations where it is particularly common. In children it is often met with on the scalp and ears, forming moist, yellow crusts, from beneath which oozes a thin fluid that mats the hairs together. It comes on whilst they are teething, and sometimes lasts for years. In older children it is more common at the bend of the elbow and knee, where the skin becomes thick and covered with deep, painful cracks. In middle life eczema occurs in its acute forms on the face or body, and is then often associated with gout and rheumatism. In these cases other manifestations of gout alternate with eczema; a gouty joint or internal gout appearing as the skin eruption subsides. In women, especially at the change of life, eczema occurs with great frequency. They are also liable to eczema of the nipple, causing cracked nipple, which is recognised as one of the predisposing causes of cancer of the breast. In old people a favourite situation is on the lower part of the legs, and in such patients it is often associated with varicose veins.

Symptoms.

An attack of eczema is usually preceded by sensations of itching and burning of the part. This grows red and becomes covered with a crop of minute blisters, about the size of a pin's head. The affected part is inflamed, for eczema is essentially an inflammation or catarrh of the skin : there are redness, heat, pain, and swelling, and, added to these, intense itching. The blisters enlarge, run together, and finally burst or are broken by scratching, and a clear, watery, sticky fluid oozes out. Crusts form on the affected surface, and the discharge continues to run from under them. The general symptoms are not important, and there is seldom much fever. This is an attack of acute or " weeping " eczema; it may subside and disappear in a few days, or crops of vesicles may form one after the other, and the affection spread over large surfaces. Or the acute inflammation may gradually subside and pass into a chronic condition, which may last for years.

Although small blisters discharging fluid are an essential part of acute eczema, the symptom may be but transitory, and, in many cases of chronic eczema, may have long passed away and been unnoticed. The skin in the chronic form is thickened and hard, and covered with crusts or scales; deep cracks may form, especially where the skin is subjected to much movement, as at the joints. This disease is not usually contagious, but it may be occasionally transmitted from one person to another by actual contact, as from an infant to its nurse, and such exceptional cases are sometimes to be explained by the presence of germs.

Treatment.

For the treatment of eczema both constitutional and local measures are requisite. There are no specific drugs which cure eczema, but in an acute attack, with much smarting, throbbing, and pain, a simple sedative draught is useful such as the following:—

PRESCRIPTION 118

Bicarbonate of potash	2 drachms.
Solution of acetate of ammonia	1½ ounces.
Bromide of potash	1½ drachms.
Tincture of orange	2 drachms.
Water to 8 ounces.	

An eighth part to be taken every 4 hours.

For distinctly rheumatic people 10 grains of salicylate of soda may be added to each dose.

The patient should stay in bed, lightly covered with blankets, as he can there keep his skin at a uniform temperature, avoid the irritation of clothing, and more thoroughly apply the local measures of treatment. His bowels must be thoroughly moved with a dose of Carlsbad salts and kept regular; his diet must be simple and unirritating, consisting chiefly of milk and starchy foods; he must take no stimulants.

To turn to local treatment, the first steps must be directed to the removal of any known source of irritation. Before any remedies can be applied with benefit to the inflamed part it is necessary to remove all crusts and scales, and this can best be done by covering them with lint soaked in olive oil, or with warm bread poultices. Great care must be taken, in applying remedies, not to rub or irritate the tender skin.

During an acute attack of eczema no plain water should be allowed to touch the skin, or it will be sure to increase the trouble; hard water is particularly harmful, and rain water or boiled water should always be employed for lotions or washing purposes. Soap also is irritating to the eruption. Care should also be taken to prevent the discharge from touching the surrounding skin, as it is sure to set up irritation and spread the disease. In order to cleanse the skin, the water should be softened by the addition of bran, oatmeal, or white of egg, or the following powder:—

PRESCRIPTION 119

Starch	2 parts.
Boracic acid	1 part.
Bicarbonate of soda	1 part.

A tablespoonful to be mixed with 1 pint of warm water.

Pledgets of cotton-wool should be used as sponges, and the parts should be dried by dabbing with pieces of old linen.

In acute eczema affecting a large area of skin, warm lotions should be applied, for the relief of pain, on lint or linen, and kept moist and warm by being covered with oil-silk. Boracic acid (1 dessertspoonful to 1 pint of water), dilute lead lotion, or thin starch can be recommended. The parts may with advantage be covered over with a sedative ointment smeared thickly on to lint, for which purpose 1 drachm of solution of subacetate of lead to 1 ounce of vaseline will be found useful. As the irritation subsides, a stronger ointment may be employed, such as equal parts of zinc and boracic acid ointments.

In the eczema of children nothing is better than benzoated zinc ointment thickly spread on lint or linen and laid over the part. These little patients are usually debilitated, and require good feeding and tonic medicines. Cod-liver oil is excellent, a teaspoonful or two to be taken three times a day. Steel wine may be taken with it, one teaspoonful of each being the dose. Kepler's extract of malt and cod-liver oil and Parrish's food are also useful.

The treatment of chronic eczema must be more stimulating, and either tar ointment, oil of cade ointment, or one formed of equal parts of zinc and sulphur ointments, should be used. It is in the more chronic forms that arsenic taken internally proves of value, and, indeed, is almost indispensable. Three drops of the solution of the drug in water should be taken three times a day after food.

To relieve the troublesome itching, powder of oxide of zinc, 10 grains in 1 ounce of lime-water, or a lotion composed of carbolic acid 1 drachm, glycerine 2 drachms, to 8 ounces of water, will be found useful.

SWEAT RASH

A sweat rash (sudamina) is formed by a number of small blisters, which look like drops of dew on the skin; they consist of minute collections of perspiration in the sweat-glands, and are prevented from escaping on to the surface by a blocking of the little "pores." They usually disappear entirely in the course of a few days, leaving a slight scurfiness, and they may be succeeded by other crops. They appear in the course of certain fevers, especially typhoid, and are not uncommon in consumption. They most frequently occur on the chest and abdomen, but may appear wherever there are sweat-glands. They simply show that the patient has had a free perspiration, and should lead to inquiries into the ventilation and temperature of the sleeping apartment and the condition of the body linen. No treatment is necessary.

Another form of sweat rash, known as miliaria, consists of pointed vesicles surrounded by redness, which denotes that slight inflammation is present. The fluid in them becomes thick, and dries up in the course of a few days, forming small scales, which soon drop off and are attended by more or less itching. The vesicles are frequently seen on the body and limbs in acute rheumatism. The only treatment required is to cover them over with a simple dusting powder or some boracic ointment.

" PRICKLY HEAT "

Yet another form of sweat rash (miliaria papulosa) is that so commonly met with in the tropics, called " prickly heat." It occurs also in England, particularly in those who have had it abroad. The spots come out suddenly, with much prickling and tingling, especially on those parts of the body which are covered. It is not at all uncommon during the summer months to see the bodies of children, or even of adults who perspire freely, especially if they are not frequently washed, covered with a crop of these little blisters. Fat people who perspire freely are liable to the complaint, and flannel underclothing seems to produce it. A dose of simple salts, magnesia, or fruit salts, as a cooling aperient, is useful, with an alkaline or bran bath, and this, with boracic ointment or dusting powder to relieve irritation, is all the treatment usually required. The diet must be reduced for a few days, and limited to very simple foods, with no alcohol.

HERPES—SHINGLES

Herpes is the general name given to a class of skin diseases characterised by the eruption of minute vesicles or blisters.

One variety often appears on the lips in company with a common " cold in the head," and generally accompanies pneumonia. It produces a good deal of tingling and burning, but is of little importance. The spots dry up, and usually disappear in the course of a few days. It is simply necessary to protect them with a little boracic ointment.

Shingles (a girdle), or herpes zoster, is an eruption caused by an inflammation of the nerve of the affected part, although it does not always accompany such inflammation. It usually occurs without any recognisable cause, although some cases can be traced to blows or other injuries. The eruption is heralded by a burning, stinging pain, with slight fever. Patches of redness form, and after a time become covered with a number of little blisters, which develop in long lines, or in clusters that follow the course of the underlying nerves. The fluid in the spots is at first clear, but gradually thickens. After a few days the blisters shrivel up and form small crusts, or they break and leave painful little sores. The common situation for shingles is on the side of the chest, but it may appear on the abdomen or face, and if it affects the brow is liable to spread to the eye and damage the sight.

Symptoms.

The whole attack occupies about a fortnight, but in elderly people a most persistent form of neuralgia is often left for months afterwards. Shingles appears at any age, and seldom occurs a second time, but some persons have what may be called chronic herpes, crops of little painful blisters appearing whenever they are out of health or are subjected to nervous strain. There is a popular belief that if shingles meet round the body the attack will end in death, but the appearance of the eruption on both sides of the chest at the same time is so rare that it is difficult to prove this notion either true or false.

Treatment.

To ease the pain and prevent the formation of the troublesome little ulcers, it is necessary to exclude the air from the eruption. This may be done by applying zinc ointment or by powdering flour over the part and covering it with a layer of cotton-wool. A useful dusting powder consists of equal parts of oxide of zinc and bismuth. The best plan, however, is to paint over the eruption with a soft brush a layer of flexile collodion, which, after evaporation, leaves a protective film. If this wears off or the pain is severe, menthol ointment or cocaine ointment should be applied freely, or a sedative preparation called anodyne colloid, which should be covered with a piece of moist spongiopiline. Internally, a 5-grain tablet of antipyrin may be necessary to relieve the pain, and this may be repeated as required. Tonics also are beneficial, such as quinine, strychnia, steel wine, and cod-liver oil, and the general health must be improved by good feeding.

2. Eruptions formed of Simple Redness

ERYTHEMA

Erythema consists of patches of redness which disappear on pressure, and is produced by an enlargement of the vessels of the affected part. The patches may be of any size or shape. When at their height they are a bright red, but become bluish when they are disappearing. The affected parts feel hot to the hand, and give the sensation of burning or itching, but there are no general symptoms of fever. Erythema may appear under many different conditions, causing irritation of the blood-vessels of the skin. Erythema pernio is the common chilblain. The redness caused by lying for a long time on one spot, redness of the nose and cheeks after meals, flush produced by sunburn, are all forms of erythema. In children it is usually the result of some irritation, such as teething, unsuitable food, or worms.

Erythema nodosum is an eruption of red, swollen patches, which occur most commonly on the shins, but occasionally on other parts. They come out in crops of two or three at a time, are round or oval in shape, and vary in size from a walnut to a hen's egg. At first they are bright red, but as they disappear they pass through the gradations of colour seen in a bruise. They are tender to touch, and cause a good deal of tingling and burning. The spots last about a fortnight, but as they are liable to come out in successive crops the whole attack spreads over some five or six weeks, and each spot, as it gradually disappears, is usually followed by some slight peeling of the skin. The affection occurs chiefly in girls under twenty, especially in the spring and autumn. It is closely connected with rheumatism, usually occurring in those liable to that complaint, and may be brought out by exposure to sea-breezes.

Treatment.

The first step in the treatment is to remove the cause, to avoid unsuitable food or constipation, and to soothe the local irritation by warm baths. In the acute stage of erythema nodosum, rest in bed is advisable. Salicylate of soda, in 5- to 15-grain doses three times a day, according to the patient's age, is to be recommended; and during convalescence the bark and ammonia (Pr. 98) or quinine and iron (Pr. 77) tonics. The spots should be treated with a compress of warm lead lotion.

ROSE RASH

Rose rash, or roseola, is of trifling importance, and is accompanied by no danger. It is named from the appearance of the spots, which are slightly raised, rose-coloured patches. It is caused by errors of diet, occurs chiefly in hot weather, and in young children may be set up by teething. Some slight fever and dryness of the throat are present, but these, with the spots, usually disappear in the course of a few days. Rose rash is not infectious, but causes much anxiety from the great difficulty in distinguishing it from scarlet fever, measles, and German measles. The spots appear on all parts of the body, and are of irregular shape; there are no signs of cold in the head, which distinguishes it from measles, and the fever and other symptoms are less severe than in most cases of scarlet fever.

Treatment consists in keeping the patient quiet and warm and administering a mild aperient, at the same time regulating the diet.

CHAFING

Chafing, or intertrigo, is produced by the friction of two surfaces of skin against one another, and especially occurs in those parts where the skin is moistened by perspiration or discharges. It is most common in the groins, armpits, and necks of babies and of fat persons, and it may easily run into eczema if neglected. The affected parts are reddened, shiny, and sore. To cure this condition it is necessary frequently to wash the parts with boracic lotion (a teaspoonful of boracic acid to a tumblerful of warm water), lead lotion, or oatmeal water. They should then be carefully dried by dabbing with a soft towel and dusted over with Fuller's earth or a powder containing equal parts of oxide of zinc and starch.

NETTLE RASH

Nettle rash, or urticaria (from *urtica*, a nettle), is especially common in infants, and affects women more frequently than men. Persons of nervous disposition, or with gouty tendencies, are its special victims, and often show an hereditary predisposition to it.

Causes.

Its causes may be external or internal, the external causes being stings of nettles, jelly-fish, wasps, bugs, fleas, and mosquitoes; the irritation of flannel garments or of hairy caterpillars. But more commonly the cause is internal, and is usually consequent upon constipation or the consumption of shell-fish—mussels, crabs, and lobsters—pork, almonds, strawberries, parsley, mushrooms, or oatmeal.

Symptoms.

The eruption is very similar to the sting of a nettle, and consists of wheals of various shapes and sizes. These are patches of redness, slightly raised, with white areas in their centres. The rash comes out suddenly, perhaps within an hour after taking food, and the spots itch, tingle, and burn severely, and are made worse by scratching. They disappear as suddenly as they come, and seldom last more than twenty-four hours. Occasionally, however, the spots come out in successive crops, and in this way the disease may continue for months, or even years. In some cases there is slight fever.

Treatment.

If some internal irritation can be distinctly traced, it may be removed by an emetic or a purge, and the diet should be as simple as possible. If either ague, gout, or rheumatism is present, it must be dealt with. The itching caused by the rash may be relieved by the application of lead lotion, by dusting on starch powder, or by taking a warm bath. All risks of chill should be carefully avoided, and in many cases great benefit may be obtained from remaining in bed for a day or so, for there the patient can best keep warm. But excessive warmth is bad, as it increases the itching. The clothing should be soft and unirritating, and often a silk or cotton garment worn under the woollen one gives relief. In prolonged cases the general health requires special attention: the bowels must be regulated, the food must be light and simple, and no alcohol should be taken. If these measures fail, a good holiday, and if possible a sea voyage, should be tried.

3. Eruptions formed of Blood-Spots

PURPURA

In this disease the spots, due to bleeding into the skin, may be mere points or lines, small patches or large bruises. They do not disappear under pressure with the finger. At first they have a distinct edge, but later this is lost. When they form they are bright red, become gradually purple, or even black, and pass through the various colours of a bruise as they fade away. They come on with pains in the joints and limbs, accompanied by slight fever, but they last only a few days, and then gradually disappear. But fresh crops of spots are liable to follow, and may prolong the attack over some weeks. Women are more liable to the disorder than men, especially women between the ages of twenty and thirty. It was at one time believed to be rheumatic in origin, from the pains which always occur, but these pains are now believed to be caused by bleeding into the joints.

The treatment is to stay in bed, take a liberal nourishing diet and a tonic, the quinine and iron mixture (Pr. 77) being very suitable. Most cases get quite well.

4. ERUPTIONS FORMED OF "MATTERY SPOTS" (PUSTULES)

IMPETIGO

Symptoms.

Contagious impetigo chiefly affects the parts uncovered by clothes, occurring most frequently on the face, especially about the mouth, nostrils, and chin, and occasionally on the back of the head, under the hair. The eruption consists of little mattery spots, which are preceded by redness; there may be but a few scattered spots, or they may spread all over the body. The pustules soon break and discharge the matter, which quickly dries up into scabs and crusts. The scabs at first are yellow, and not unlike crystallised honey, but soon become brown or black from dirt. From beneath the crusts a mattery discharge oozes, so that they look as if they were stuck to the skin with gum. They leave a raw surface, from which comes a discharge that soon forms a fresh crust. They finally heal, leaving a reddish stain, which gradually disappears.

The eruption is caused by micro-organisms which have entered and set up inflammation of the hair follicles or roots, and a hair can often be seen projecting from the spots. The affection is far more common in children than adults, especially in those who are delicate, ill-fed and uncared for. It is transmitted by contagion from one person to another, and from one part to another by the finger-nails, and it is predisposed to by dirt or irritating substances. A very common complication is inflammation of the lymphatic glands in the neighbourhood.

Treatment.

The affected parts should frequently be washed with a lotion formed of boracic acid (one teaspoonful to one tumblerful of warm water), and if scabs have formed they must be carefully removed after they have been softened with carbolised oil or a bread poultice. If the spots are few in number they may be cured by drawing out the hairs from them by the roots. Scratching of the parts should be prevented by covering them with white precipitate ointment or with equal parts of sulphur ointment and vaseline. In children cod-liver oil is useful to improve the general condition, and in adults tonics, especially quinine.

PRESCRIPTION 120

Sulphate of quinine	8 grains.
Dilute sulphuric acid	1½ drachms.
Syrup of orange	½ ounce.

Water to 8 ounces.

An eighth part to be taken 3 times a day after meals.

CHAPTER XXI

DISORDERS OF THE SKIN (*concluded*)

Prurigo—Pruritus—Pityriasis—Psoriasis—Lupus—Acne—Acne Rosacea—Barber's Itch—Chloasma—Ringworm—The Itch—Pediculosis.

5. Eruptions formed of Pimples (Papules)

PRURIGO

THE spots of prurigo are scattered pimples, but when first formed are of the same colour as the skin. These, with intense itching, are the symptoms of the complaint, sometimes accompanied with a sensation as of insects crawling over the part. After a time the spots become altered in appearance, being reddened, enlarged, and covered with spots of blood from the uncontrollable scratching. The itching is increased when the body is warmed by exercise or when in bed, and by the consumption of alcohol or of rich, strongly flavoured food. The spots appear on the back of the arms, the front of the legs, the back and front of the chest, but seldom on the other aspect of the limbs or on the face.

The chief causes are poverty and unhealthy surroundings, but the immediate cause is a little-understood affection of the nervous system. Prurigo occurs more often in men than in women, and is common in quite young children. Unless cured early it may become inveterate and last for years; indeed, some cases seem to be quite incurable. It is not dangerous to life, but may injure the health from sleeplessness caused by the constant irritation. The sore places on the skin produced by scratching sometimes set up inflammation and swelling of the lymphatic glands.

Treatment includes improvement of the general health by a plentiful and nutritious diet and by tonics—iron in adults and cod-liver oil in children—and locally by the applications to be mentioned for allaying itching in our next section, on Pruritus.

PRURITUS

Itching may occur without the eruption of pimples, and, indeed, without any visible change in the skin at all or any evident cause; it is then called pruritus. This is one of the most troublesome of complaints. It is aggravated by conditions similar to those mentioned under Prurigo. It may affect the whole body, and is then often a concomitant of such general diseases as gout, rheumatism, jaundice, liver affections, diabetes, or indigestion. In some persons it is said to be due to the use of tobacco. When it takes a local form some definite cause can usually be discovered. If it affects the skin about the anal region it is due to piles, confined bowels, or worms; in diabetes it may result from the irritation of the skin by the abnormal urine. Itching of the nose is sometimes due to worms and sometimes to gout.

Causes.

The treatment of many cases of itching requires great perseverance, and must start with a careful inquiry into the habits and general health. Assuming that the itching is not due to such a vulgar cause as parasites, the diet must be regulated; coffee, tea, sugar, alcohol, shell-fish, pickles, and highly seasoned dishes must be abstained from in turn until the offending substance is discovered. White meats, green vegetables, and light milk puddings only should be taken, and only plain or mineral water be drunk. The clothing should next be overhauled, flannel or rough woollen clothes given up, and silk or other unirritating material worn instead. If the affection continues, the question whether constitutional conditions may not be at fault will have to be considered. Many drugs have proved useful for this trying complaint, but they are powerful and liable to do harm as well as good, and they should therefore only be taken under medical advice.

Treatment.

External treatment is often the most efficacious. Turkish baths, or baths medicated with bran 2 lb., or bicarbonate of soda 2 ounces, to 30 gallons of warm water, may be tried, or a course of baths—either the sulphur waters of Harrogate, Strathpeffer, or Aix-les-Bains, or the "indifferent" waters of Bath or Buxton. Hot water is soothing, and often relieves the irritation when pressed against the spot in a sponge. Useful lotions to be applied to the irritable parts on pieces of linen can be prepared by mixing water with an equal quantity of vinegar, eau de Cologne, or sal-volatile. Lead lotion, or "black wash," may be tried, or either of the following:—

PRESCRIPTION 121

Carbolic acid	1 drachm.
Glycerine	2 drachms.
Rectified spirit	3 drachms.

Camphor water to 6 ounces.

Make a lotion. To be dabbed on the affected part or applied as a compress.

PRESCRIPTION 122

Bicarbonate of Potash	1½ drachms.
Glycerine	1½ drachms.

Elderflower water to 6 ounces.

Make a lotion. To be dabbed on the affected part or applied as a compress.

Menthol, aconite, and cocaine ointments are sedative, and can be recommended. Care must be taken, in applying drugs, that the skin is unbroken, as many of them are irritating, and will cause pain if applied to a raw surface. The most successful remedy, whatever experience proves it to be, should be kept by the bedside, so that it may be at once applied when the warmth of the bed starts the itching.

6. ERUPTIONS FORMED OF "SCALY SPOTS" OR SCURF

PITYRIASIS

Causes.

Pityriasis is the technical term for "scurf," or "dandruff," which most frequently affects the skin of the head. Quantities of greasy white scales form on the scalp, and are detached when it is brushed or scratched. Pityriasis may be caused in children by keeping their heads too hot, and in adults by sitting for hours under a lamp, or by digestive troubles and constipation. If it continues long in a severe form, a great deal of hair often comes out, and it may grow very thin.

Treatment.

The causes, if recognised, must be remedied. The head must be kept clean; there must not be over-much brushing; the brush used must not be hard, and both comb and brush must be cleaned frequently. The scalp should be washed with soap and water daily (a good preparation being the alkaline spirit of soap) and then rubbed with the following lotion, which is a strong poison :—

PRESCRIPTION 123

Corrosive sublimate	5 grains.
Alcohol 90 per cent.	2 ounces.

Water and rose water equal parts to 1 pint.

"The hair wash." Poison.

A much more serious condition than simple pityriasis, but fortunately one of rare occurrence is pityriasis rubra, a disease which, when fully developed, involves the whole cutaneous surface, the skin turning a deep-red colour and being covered with whitish vesicles.

PSORIASIS

Consists of an eruption formed by slight elevations of the surface of the skin, covered with white or silvery-grey scales. It is not contagious. It generally commences with small pimples, which soon become coated with scales and gradually enlarge to the size of half-a-crown or a crown. After a time the spots run together, forming irregular patches even as large as the palm of the hand. The patches most frequently appear in parts where the skin is thick and is liable to friction from the clothes, and usually on both sides of the body at once. The disease is obstinate, is generally worse in the spring and autumn, and usually there are no other symptoms, although occasionally itching is troublesome. It is extremely apt to recur. It may affect persons of any age, and its first appearance is commonly during youth, especially between the ages of fifteen and thirty.

Causes.

The cause of psoriasis is unknown, but it must be looked upon as a constitutional disease, and not as a purely local affection of the skin. It is to a certain extent hereditary, occurs frequently in perfectly healthy persons, and may be almost considered to be dependent on good health.

Treatment.

Attention must be directed to the digestion, and the diet carefully regulated. All exposure to chills must be avoided, and the clothing must be warm but unirritating. A change to a mild climate is often found to aid local treatment. Of internal remedies, arsenic is by far the most valuable, and is particularly to be recommended in the long-continued, inveterate cases, but care must be taken not to give the drug in too large doses or for too long a period, as much harm may follow from chronic arsenic poisoning. Three-drop doses of the solution of arsenic with water should be taken three times a day after meals, gradually increasing the dose to 5 drops three times a day. In the early stages 10 grains of salicylate of soda three times a day will prove useful.

Before treating the spots with ointment they should be well washed with hot water and soft soap to remove all the scales. In the early stages, when redness is present around the spots, they may be covered with olive oil or cold cream, but in chronic cases more stimulating ointments are necessary, either chrysarobin (15 grains), pyrogallic acid (10 grains), or resorcin (10 grains), mixed with 1 ounce of prepared lard or lanoline. These are strong drugs, and must be used with caution. Chrysarobin stains the skin and linen, but is very efficacious. Lastly, a course of baths is sometimes found beneficial.

7. Eruptions formed of Small Swellings (Tubercles)

LUPUS AND LUPUS ERYTHEMATOSUS

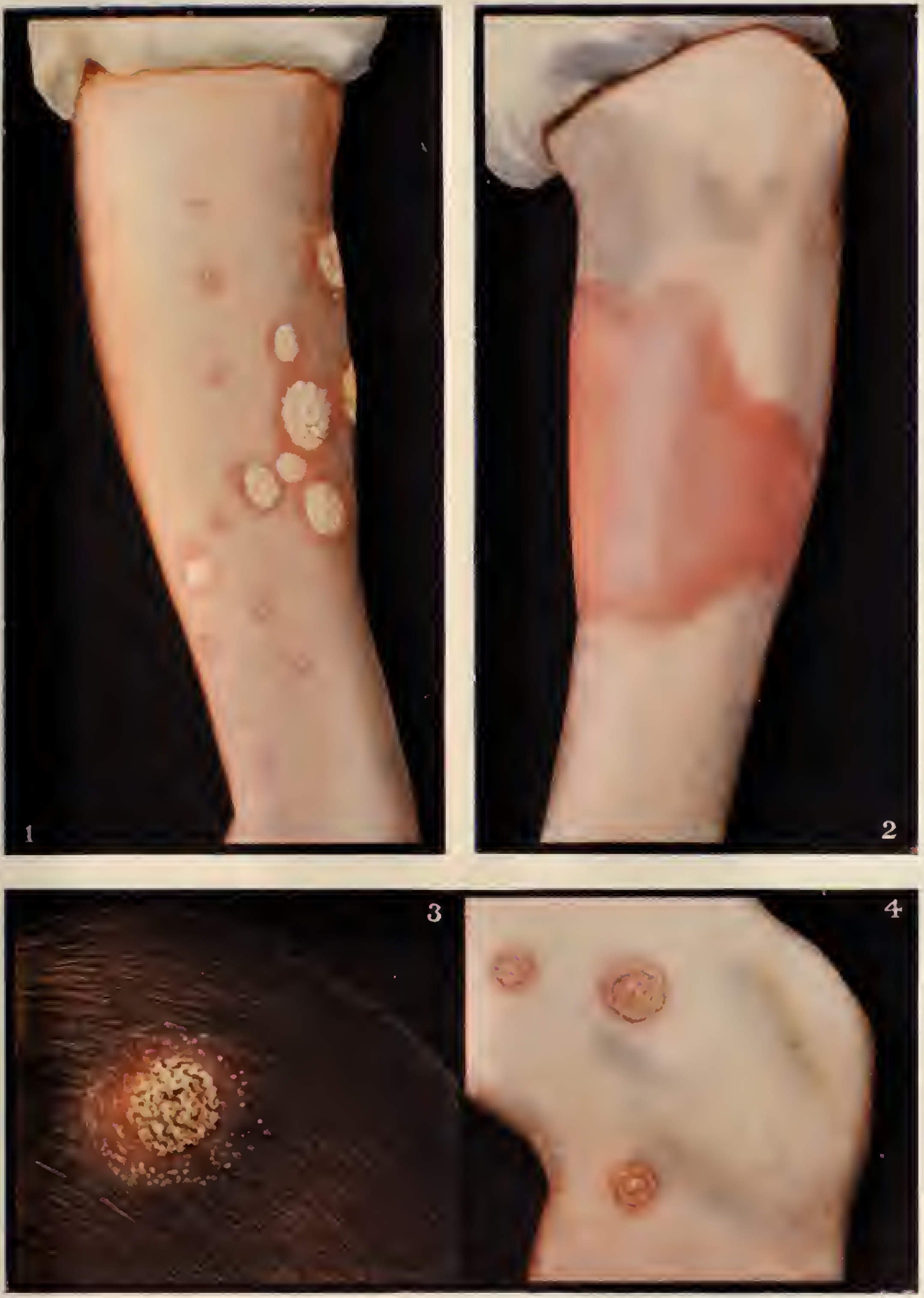
Lupus (formally lupus vulgaris) has received its name—*lupus*= "wolf"—as well as that of "noli me tangere" (touch me not), from its destructive character. It is caused by the tubercle bacillus, the same organism that produces consumption, but, although it is of germ origin, its progress is very slow, and the disease may continue to spread for many years. It commonly begins in childhood, especially in the female sex, and, however long it may persist, does not affect the general health, except in rare cases. It occurs most often on the face, at the sides of the nose and the lips, and gradually spreads widely from its point of origin. It attacks both skin and mucous membrane, and commences as a small swelling or nodule, which is soft, brownish-red, and translucent, like apple jelly. This grows and becomes surrounded by fresh spots of a similar character, which unite and spread, destroying the parts in their neighbourhood, forming a gradually enlarging circle of disease, and often leaving a healed and scarred patch in the centre. In other cases the disease eats deeply, and may destroy the gristle of the affected parts.

Symptoms.

Treatment used to consist of scraping, burning, or the use of caustics, but the malady can now be cured by the concentrated rays of sunlight or electricity, known as the Finsen light, or by X-rays. This treatment is painless but very tedious, requiring many sittings, and can only be carried out by a trained hand. Other local measures are useful, but their application may do harm instead of good, and they should not be employed except by a medical man. No internal remedies are of any use, with the exception of tuberculin, the injection of which has proved successful in some cases.

Treatment.

Between lupus and lupus erythematosus there is no essential connection. Some authorities hold that the latter condition, like lupus itself, is of tuberculous origin, but of this there is no conclusive proof. The face is the part most commonly attacked. The disease continues to spread for years, until it seems to have spent itself. Cooling



MORE COMMON SKIN DISEASES.

1. PSORIASIS. 2. ERYSIPELAS. 3. RINGWORM OF THE SCALP 4 RINGWORM OF THE KNEE.

II

ointments may have to be applied to the lesions, or caustics may be called for, or X-rays, electricity, or Finsen light may be prescribed.

ACNE

Cause. Is an affection of the sebaceous glands of the skin. These glands, which provide the oily substance that keeps the skin supple, are at certain periods of life particularly active, and if the small ducts or pores which lead from them to the surface become blocked, the sebaceous matter collects and forms minute swellings, which may be only little red pimples or may become inflamed and painful, when a few drops of matter will form and discharge. The spot may then disappear entirely or may leave an unsightly scar. In severe attacks the face becomes much disfigured. Many of the spots have little black points upon them, and are then called comedones. By pressure it is possible to force out of them little elongated spiral white masses with a black end, which are erroneously regarded as worms. These "blackheads" are, however, only collections of dirt. Sometimes, however, in its midst one may discover under the microscope a minute parasite, from $\frac{1}{50}$ to $\frac{1}{100}$ inch long.

The favourite situations of acne are the face, especially the cheeks, nose, forehead and chin, the back of the neck, the back between the shoulders, and the chest, but it may occur wherever there are sebaceous glands. The disorder is especially likely to affect those who have naturally coarse and greasy skins. It most commonly attacks young persons between the ages of twelve and twenty-five, which is a time of active development. At this age any nervous strain may aggravate the tendency, and it is undoubtedly increased in some cases by disorders of the digestive organs, by anæmia, and by overwork.

Treatment. A good deal can be done in the way of prevention in those who are predisposed. The general health should be attended to, the digestion improved, and anæmia corrected by a course of iron. The diet must be simple, and everything likely to cause flushing of the face, such as stimulating food, tea, coffee, and alcohol, should be avoided. Smoking also is sometimes injurious. The affected parts should be well rubbed every night with simple cold cream, or with an ointment of 10 grains of sulphur to 1 ounce of vaseline, and thoroughly scrubbed the following morning with soap and a flannel, and dried with vigorous friction of a towel.

If free from inflammation, the spots, when formed, may be cured by carefully squeezing out their contents between the nails or with a little instrument which can be obtained for the purpose, and washing the part. The sulphur ointment we have referred to above may be continued, or one containing resorcin, 15 grains to 1 ounce of vaseline, may be used. If matter has formed in the spots it should be let out with a prick of a clean needle, and then the part bathed freely with hot water. Care should be taken that fresh spots are not caused by re-infection with the clothing, and the under-garments should be changed frequently. The general health must be improved by tonics.

ACNE ROSACEA (GROG-BLOSSOMS)

This form of acne is so different from that just described that it is considered by many to be a distinct disease. It affects the centre of the face, involving the nose first and most severely, but gradually spreading to the cheeks, forehead, and chin. It has received its name of "grog-blossoms" because of the popular belief that it is due to alcoholic excess. It is sometimes caused in this way, but may appear in perfectly temperate people who suffer from bad digestions and feeble circulation, and in those who are much exposed to the weather and to frequent changes of temperature. The disorder first shows itself as a bright flush of the skin, which passes off quickly but returns with great frequency after meals or exposure, and finally becomes permanent, the nose being particularly affected. In course of time acne pimples form on the reddened spots, with much itching and burning, and later still the blood-vessels become enlarged, and form distinct blue or red streaks. In the worst cases the skin of the nose grows enormously swollen, lumpy, and thickened, and presents a great disfigurement. The affection is one of middle or advanced life, is more often met with in women than men, and is sometimes produced by the use of irritating cosmetics.

Causes.

In the early stages much may be done to check the trouble by treatment of any digestive disorder and careful regulation of the diet, which should be nourishing but unstimulating. No alcohol nor anything likely to cause flushing of the face should be taken; as tea and coffee often do this, they should be discontinued. The bowels should be carefully regulated, and exposure to rough weather avoided. Ichthyol is a valuable drug; a 2½-grain tablet should be taken on an empty stomach night and morning, and the dose gradually increased to 10 grains. Locally the treatment recommended for simple acne should be adopted. A useful lotion is calamine 40 grains, glycerine 20 drops, to 1 ounce of rose-water. Many cases have

Treatment.

been cured by applications of X-rays and Finsen light. In the late stages the enlarged blood-vessels may be destroyed by caustics, or portions of the outgrowth may be removed by operation.

8. Eruptions formed of Increased or Diminished Pigment (Maculæ)

Pigment, as we have previously explained, is formed by certain cells of the skin, and its production is influenced by many conditions, such as race and climate. It is increased in certain parts at the time of puberty and during pregnancy, and is seen in excess under the eyes in states of general ill-health. Pigment is formed freely from exposure to bright light and heat. Yellowish-brown irregular patches are sometimes formed in this way on fair-complexioned persons, especially on the exposed parts of skin. Exposure to heat is the cause of the brownish-red stains so often seen on the front of the legs of old people, and a similar condition often follows the spots of many skin disorders. The one disease which is accompanied by this symptom is that of the suprarenal capsules, called Addison's disease, which has already been described (Vol. I., p. 182).

Moles are thickened patches of skin which contain a large amount of pigment of various shades, and vary in size from a pin's head to several inches. The treatment of them is considered in connection with surgical complaints. Many other conditions are met with in which excess of pigment shows itself. One curious disease, especially occurring in the black races, in which white patches, devoid of pigment, form on the skin, is called leucodermia.

9. Eruptions caused by Vegetable Parasites

BARBER'S ITCH

This affection is also called "chin whelk" and sycosis. It is sometimes produced by ringworm, but is more commonly due to micrococci, which enter the hair follicles and set up an acute inflammation. Usually met with on the chin, it occasionally attacks the moustache, whiskers, eyebrows, eyelashes, and other parts. The eruption consists of mattery spots which form in the hair follicles around the hairs, and each spot has therefore a hair projecting from its centre. The discharge oozes out and forms thin brown or yellow crusts; the hairs become loosened and fall out, and when the eruption heals it leaves scars, but does not usually cause baldness. The disease is contagious, and is transmitted by the use of shaving brushes or razors that have not been properly cleansed.

Treatment. Preventive treatment consists in securing thorough cleanliness of the shaving instruments, for the germ which is the exciting cause is always present in the air. The razor should be well washed in hot water both before and after shaving, and the skin carefully sponged when the process is completed. These precautions also will prevent the various sores and spots of a milder character which are so frequently considered to be caused by a tender skin but are really due to want of the cleanliness which should be observed in shaving.

To cure the complaint the first step is to remove the crusts, after softening them with oil or a bread poultice. The affected hairs should then be pulled out with a pair of forceps—a process that causes but little pain owing to the loosening of the hairs by the disease. The removal of the hairs allows both the escape of the discharge and the entrance of remedial applications. Mercury is the best germicide; a 2 per cent. oleate of mercury should be painted over the affected surface with a brush and covered with linen rag, or the part should be bathed with a lotion of 1 grain of corrosive sublimate to 1 ounce of water, and then covered with lanoline ointment.

CHLOASMA

Chloasma, otherwise "liver spots," consists of irregular-shaped patches of discoloration, varying from fawn to liver colour, most commonly seen on the chest or back, to which they give the appearance of a map. They are produced by a fungus which grows in the superficial layers of the skin. The affection, which is mildly contagious, occurs in early adult life, especially in men, and is more likely to attack the skin after free sweating, being common in consumptive persons. Want of cleanliness and the wearing of flannel underclothing after it has become soiled may also cause it, but it often attacks those who are both clean and healthy. The spots itch, are rounded, slightly raised and scaly, and may cover large tracts of skin, and they are so superficial that by scratching with the nail the healthy skin may be exposed underneath.

The treatment consists in thorough washing with soap, warm water, and a nail-brush, and the application of a lotion of solution of sulphurous acid, 1 part to 3 of water.

RINGWORM

Ringworm is a most troublesome and contagious disease of the skin and hair, produced by vegetable parasites or fungi of various species belonging to two different families, the Microsporons and the Trichophytons. The parasite is formed of a network of fine threads with minute oval bodies called spores, though they are not true spores. When this affects the skin it grows in the cells of the epidermis, but on the hairy parts it is found to penetrate deeply into the hair follicles or roots.

Cause.

Ringworm is of two varieties—that which affects the head or other hairy parts, and that which affects the hairless parts. Although the same fungus is found in both, the appearance of the eruption and the course it takes are quite different.

Ringworm of the head is virtually only met with in children, especially those from five to ten years of age and those who are out of health. Ill-health must be looked upon as a predisposing cause, and usually explains the inveterate nature of some attacks. Fair and fine hair is more liable to be affected than that which is coarse and dark. The eruption appears as round, red, slightly raised patches, which are covered with a dirty greyish-white powder formed of fungus and scurf. The skin becomes inflamed; little watery spots form, which may finally become mattery and break, leaving thick, dirty scabs. The affected hairs are shrivelled and twisted, and finally become broken off a short distance from the skin. The spots are now slightly raised and swollen, covered with short stumpy hairs, like stubble, and of slate or reddish colour. They may spread indefinitely, and, joining with others, lay bare large areas of the scalp. Apart from the eruption, there are no symptoms except itching of the spots; the health, even in the delicate, is unaffected, and it is only in the worst cases that permanent baldness follows.

Ringworm of the body may appear on any part—face, neck, hands, or elsewhere. It begins as a slightly raised red spot with a distinct edge; the spot gradually grows larger, and as it does so the central portions heal, whilst the edge forms a ring and extends. The surface is covered with dirty, branny scurf, and the edge often forms small blisters, or even pustules. There is then some pain, but usually the patient has nothing to complain of but itching.

In both varieties of ringworm, when the spots are inflamed and discharge, the lymphatic glands may become inflamed, and abscesses in the neck are occasionally formed in this way.

Ringworm is usually caught from someone who is suffering from the complaint, or from one of the lower animals—for horses, cats, and dogs are liable to it—but the fungus may also be transmitted indirectly by caps, brushes, clothes, or towels. It need hardly be said that no child with ringworm should be allowed to go to school or have intercourse with other children except in the open air. So well recognised is the importance of isolating children affected with this very contagious affection that special schools are provided for children who are sufferers from the complaint.

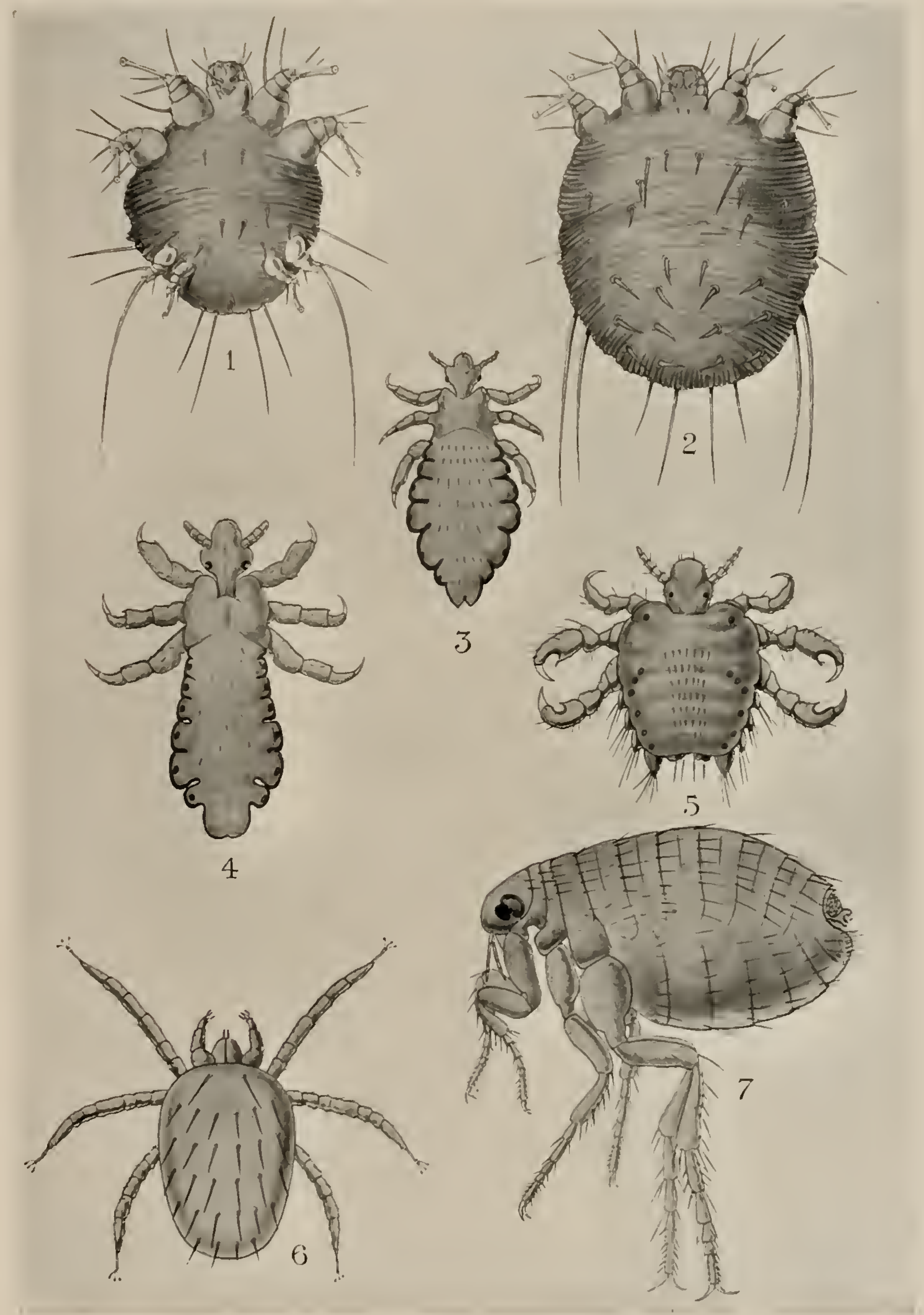
Treatment.

The treatment of ringworm of the body is far more rapidly effectual than that of ringworm of the scalp; the former may be usually cured in a fortnight, the latter often takes many months. To cure the complaint it is necessary that the fungus be destroyed, and it is because this grows deeply into the hair follicle that ringworm of the scalp is so difficult to treat successfully, for the remedies cannot be brought into actual contact with the cause of the mischief.

For ringworm of the body some of the most useful remedies are white precipitate ointment with an equal quantity of vaseline, or equal parts of sulphur and carbolic acid ointment; these should be rubbed into the spots with the finger (protected by a finger-stall) twice a day for ten minutes. Blistering fluid, a much stronger application, may also be used. Many simple cases can be cured by painting on tincture of iodine until the skin is made sore.

In ringworm of the scalp, before applying these remedies it is best to pull out with a pair of forceps all the hairs on the spots and also a ring of healthy hairs around them, in order to prevent the disease from spreading. This is not painful if done carefully. The applications advised for body ringworm should then be used, or, if stronger measures are required, Coster's paste may be scrubbed in with a hard brush. It is important to prevent scratching of the spots, for it is sure to transmit the disease to other parts. Water should never be used for cleansing the affected parts.

Recently the treatment of ringworm by X-rays has been introduced, and has proved very successful. It has been estimated that by this means the average time to cure ringworm of the scalp has been reduced from twenty-seven months to six weeks. This form of treatment can, of course, only be carried out by a specialist. The strength of the rays has to be carefully regulated, for much inflammation may be set up in the skin by too strong a dose.



ANIMAL PARASITES, HIGHLY MAGNIFIED

1 AND 2, ACARUS SCABIEI, MALE AND FEMALE (ITCH PARASITE). 3, BODY LOUSE. 4, HEAD LOUSE. 5, CRAB LOUSE. 6, HARVEST BUG. 7. COMMON FLEA.

10. ERUPTIONS CAUSED BY ANIMAL PARASITES

THE ITCH

Cause.

Scabies, or "the itch," is caused by a minute animal, the *Sarcoptes hominis* or *Acarus scabiei*. This mite is just visible to the naked eye, and is said to have been recognised as the cause of the disease by an Arabian physician in the twelfth century. The male runs about loose, but the female usually chooses for its habitation some spot where the skin is thin, such as the webs between the fingers and toes, the front of the wrists, and in women the breasts, and there works its way in and settles down. In infants, however, in whom the skin is everywhere sufficiently thin, the whole body is equally liable to infection.

The irritation produced by the insect in the skin causes the intense itching from which the affection derives its name. The parts are scratched and torn, and the marks thus produced are almost sufficient to conceal the eruption characteristic of the disease. With a small magnifying glass this, however, can be made out. A little blister marks the point of entrance, a tiny ridge and a dark line the burrow along which the animal has passed. In its progress each mite lays about fifty eggs, and having travelled from one-eighth to half an inch it ceases to burrow, and dies. The eggs are gradually hatched in the course of a week or so, and the young parasites escape from their captivity. It can well be understood that this process causes much irritation, and may set up inflammation. The itching is often most intense, and is especially troublesome at night, causing much disturbance of sleep.

The mite is transmitted from one person to another, either by direct contact or by the clothes or bedding, and it is seldom that the disease confines itself to one member of a household. This is one of the chief signs that should cause suspicion of scabies, and if the characteristic spots are discovered between the fingers or elsewhere, there remains no doubt. It is well also to remember that no one, however cleanly, is necessarily exempt from attack if exposed to contagion.

Treatment.

Treatment consists in the destruction of the insect, both in the skin and the clothing, and is usually rapidly successful when vigorously carried out. The patient must be stripped, and the itching parts soaked in hot water and then scrubbed with soft soap so as to remove the superficial layers of the skin and open up the burrows, and some insect destroyer should then be applied to all the affected parts. Sulphur is the drug usually employed, either as sulphur ointment or as soap, or both, but the ordinary sulphur ointment is unnecessarily strong, and should be diluted—1 drachm of sulphur ointment to 1 ounce of lard or vaseline. An even better ointment, as it has no smell, is the compound naphthol ointment. Whichever is used, it should be applied freely, left on all night, and washed off the following morning. To relieve the effects of scratching or the irritation resulting from treatment, some boracic ointment should be applied. It is well to remember that itching may continue for some time after all insects are destroyed, and that re-infection is not unlikely to occur from other members of the household. Care should be taken to disinfect all clothing with heat.

PEDICULOSIS

Phthiriasis and pediculosis are the names applied to the presence of lice about the person. There are three varieties of this insect—the head louse, the crab louse, and the body louse, and they vary in size and appearance as well as in habitat. They are small, semi-transparent insects, with flat bodies, six legs furnished with little claws, and mouths provided with suckers or tubes. The tube is passed into the duct of a sweat-gland and the blood sucked out; when it is withdrawn it leaves a tiny red spot of blood, which is characteristic of the bite of lice. The body louse is the longest, the crab louse the broadest of the three kinds. The head louse varies in colour with the skin of its victims, being grey with black edges on the European, yellowish-brown on the Chinaman, white on the Eskimo, and black on the negro. Lice multiply with great rapidity.

The head louse is common on the heads of dirty children, but may be found on heads that are perfectly clean. It is always caught from someone else, either directly or through brushes, towels, caps, etc. It causes intense itching, and the scratching this necessitates often produces abrasions, inflammation, and even mattery discharge which sticks the hairs together, and frequently affects the glands in the neck, which may break down into abscesses; but this only happens in the worst cases. If the head be examined, the little insects are soon discovered, and their eggs are seen, looking almost like flakes of scurf, firmly fixed to the hair with a gummy material.

Treatment.

To cure the affection it is necessary to kill the insects, to remove all the eggs or "nits," and to heal the condition of the skin that has been produced by the intense irritation. In children the hair had far better be cut short, for by this the treatment is rendered easier and more rapidly effectual. The scalp should then be smeared with white precipitate ointment. In women, if the hair is saved, the scalp should be well anointed with the same ointment.

To get rid of the "nits" before they hatch is essential in order to cure the disease; this is difficult, because they are so firmly attached to the hair. The cement which holds them must be softened by soaking the hair with acetic acid or vinegar, and the hair then thoroughly combed with a fine-toothed comb. Both purposes may be attained by soaking the hair with petroleum, or by applying the following preparation :—

PRESCRIPTION 124

Ether	1 ounce.
Oleate of mercury (5 per cent.) .	1 ounce.

To destroy pediculi—for external application.

The irritation of the skin should be relieved by washing with boracic acid (1 dessertspoonful to 1 pint of warm water) and by the application of boracic ointment.

Body lice live in the clothing rather than on the skin, and affect chiefly elderly people who are careless about washing and neglect their health. The eruption they produce consists of the minute blood spots already described and the marks produced by scratching and dirt; it is best seen on the back of the neck and between the shoulders. To get rid of the parasite the clothes must be disinfected by heat, and the eruption may be healed by cleanliness and boracic ointment.

The crab louse, which inhabits the hairy parts of the body, is cured by the treatment recommended for the head louse, but the hair need not be removed.

CHAPTER XXII

DISORDERS OF THE HAIR AND NAILS

Greyness—Baldness—Alopecia Areata—Hairiness—Affections of the Nails.

GREYNESS

THE hair, like every other structure of the body, grows old and worn, and as age advances it becomes grey. But premature greyness is not uncommon; it may be hereditary, and run in families; it may depend on ill-health, or it may be the result of some great emotional disturbance. Sudden blanching of the hair occasionally happens, and some well-authenticated cases are on record. Marie Antoinette's auburn hair turned white in a single night, and the hair of a rebel sepoy being tried for his life was seen by all present to grow grey in the course of half an hour. Whilst the change of colour is taking place the hairs are parti-coloured, the root portion being white and the terminal coloured. The change is due, as we have seen, to an absence of pigment and the formation in the hair of minute air bubbles.

Local patches of grey hair are met with as a family peculiarity, but are more often the result of some interference with the nutrition of the skin of the part, such as is seen in severe cases of neuralgia. When ill-health is the cause of the grey hair, improvement, and even cure, may be expected from tonics and general treatment, but local greyness and that forming part of the decadence of age can be but little benefited by treatment. In such cases hair-dyes are the only remedy, but they cannot be recommended, as they are likely to injure the hair, and, containing strong poisons as most of them do, may injure the health also. The most common drugs in hair-dyes are lead and sulphur, but Condy's fluid and nitrate of silver are sometimes employed.

BALDNESS

The hair is constantly falling out and being renewed, and probably the life of a single hair is of but brief duration. Baldness, however, does not follow so long as the little papilla at the base of the hair follicle continues to do its duty, and forms a new hair to take the place of the one that has fallen. But after a time the powers of renewal fail, and baldness gradually comes on. This period, either from hereditary tendency, or ill-health, or local disease, is reached earlier by some people than by others. Men are much more liable to grow bald than women; hard hats, by pressure on the vessels which supply the scalp with blood, predispose to it; so, too, does the wearing of smoking-caps and night-caps. Those who spend most of their time in the open air, such as sailors, rarely suffer from premature baldness. Chronic inflammation of the scalp, which involves the hair follicle, is a fruitful cause of loss of hair, and as the first symptom it produces is excessive scurfiness, this should not be overlooked, for suitable treatment applied early is capable of warding off baldness.

Any disease which enfeebles the body lessens also the hair-producing power of the papillæ, and after severe fevers, especially enteric, it is a common thing for the hair to fall out freely. The baldness in these cases is, as a rule, only partial, and as the health is restored the hair grows thick again. The use of a stimulating lotion hastens the restoration of the hair. The baldness, however, of age cannot be cured, but premature loss of hair is often amenable to treatment.

If the skin of the head and the hair are dry and there is much scurf, some oily preparation, applied as a pomade or hair-oil, should be used, and will often restore the skin to its natural condition, but in most cases a stimulating hair-wash is required. A good hair-oil can be prepared from the following formula:—

PRESCRIPTION 125

Castor oil	2 drachms.
Almond oil	14 drachms.
Glycerine	6 drachms.
Jockey Club	1½ drachms.
Rectified spirit	4 ounces.

To keep the hair clean and in good condition, either of the following washes may be used.

PRESCRIPTION 126

Oil of bay	4 drops.
Oil of pimento	20 drops.
Acetic ether	½ drachm.
Rectified spirit	¾ pint.
Water	½ pint.

Mix and set aside for a fortnight before using.

PRESCRIPTION 127

Jamaica rum	2 ounces.
Rectified spirit	8 ounces.
Water	6 ounces.
Oil of bay	2 drachms.

Add the oil of bay last, mixing it carefully and in small quantities.

The drugs most commonly employed to stimulate the growth of hair are Spanish fly and ammonia, and one or other of these forms an ingredient in most hair-restorers. Either of the following lotions will be found useful for this purpose:—

PRESCRIPTION 128

Tincture of Spanish fly	1 ounce.
Distilled vinegar	1½ ounces.
Elder-flower water	3 ounces.

Rose water to 8 ounces.

PRESCRIPTION 129

Borax	20 grains dissolved in
Distilled water	2 ounces.

Then add gradually—

Oil of sweet almonds	2 drachms.
Laurel water	4 ounces.

PRESCRIPTION 130

The Erasmus Wilson Hair Lotion.

Almond oil	1 ounce.
Strong solution of ammonia	1 ounce.
Honey water	2 ounces.
Spirits of rosemary	4 ounces.

These should be well rubbed into the skin of the scalp (not the hair) night and morning, with a piece of flannel or small sponge; sponges fixed on handles are sold for the purpose. The hair should not be brushed too vigorously, as this tends to pull out the already loosened hairs, which might otherwise be saved.

ALOPECIA AREATA

This is a form of baldness which affects young people, and commences as a bare patch or patches on the side or back of the head, which gradually enlarge and join together. It may be the result of a mental shock or severe anxiety, and occurs in those with debilitated constitutions. It is not unlike ringworm, from which, however, it differs in the skin of the bald patch being perfectly smooth in alopecia, whilst in ringworm it is covered by stubbly hairs.

Mild cases always recover quickly, but in the worst forms it may take many months before the hair is fully restored. The general health requires attention; the diet should be liberal, and tonic medicines, such as quinine and iron, should be taken. Locally the skin must be stimulated by painting the spots with tincture of iodine or a light coating of tincture of Spanish fly, by salt baths or electricity.

HAIRINESS

An unnatural overgrowth of hair, if it affects an exposed part, may be a source of great trouble and annoyance. Sometimes moustaches and beards appear on the faces of women, and some unfortunate children grow hair all over the body, like apes. But a condition that is more frequently met with is the growth of superfluous hairs on warts and moles, or on the upper lips or chins of women. Some of these cases are amenable to treatment by electricity in the hands of skilled specialists, but pulling out the hairs is useless, and only makes them grow again thicker and stronger than ever.

AFFECTIONS OF THE NAILS

The nails are involved in many of the general diseases of the body, but require no special form of treatment. In consumption and other wasting diseases they become much curved and bent, and a similar condition accompanies chronic heart disease. With gout they often become fissured throughout their length, and with psoriasis and ringworm, dry, dull, discoloured, and furrowed transversely. All severe diseases interfere with their growth, and it is often possible to recognise the time and length of an illness by the position and width of the transverse groove caused by the thinned nail during the period of diminished nutrition. The length of a nail being taken as about four months' growth, a transverse groove across the middle would represent the thinning during an illness two months previously. Bleeding under the nail as the result of injury blackens it, and, if at all profuse, separates it from its bed and loosens it.

Most of the diseases which attack the nails are surgical in their nature, and will be described elsewhere.

CHAPTER XXIII

THE EYE

Muscles of the Eye — Eyelids — Lacrymal Gland — Eyeball — Retina — Iris — Crystalline Lens—Comparison with a Camera—Ophthalmoscope.

The eyeball, in the form of a globe about 1 inch in diameter, lies in a hollow or cavity of the bones of the skull, called the orbit. It is surrounded by fat, which allows it to move in all directions without friction and protects it from jar; the bones also protect it from external injury in front, where they are thick and strong, but behind they are very thin, and pointed instruments have often been driven into the brain through the orbit.

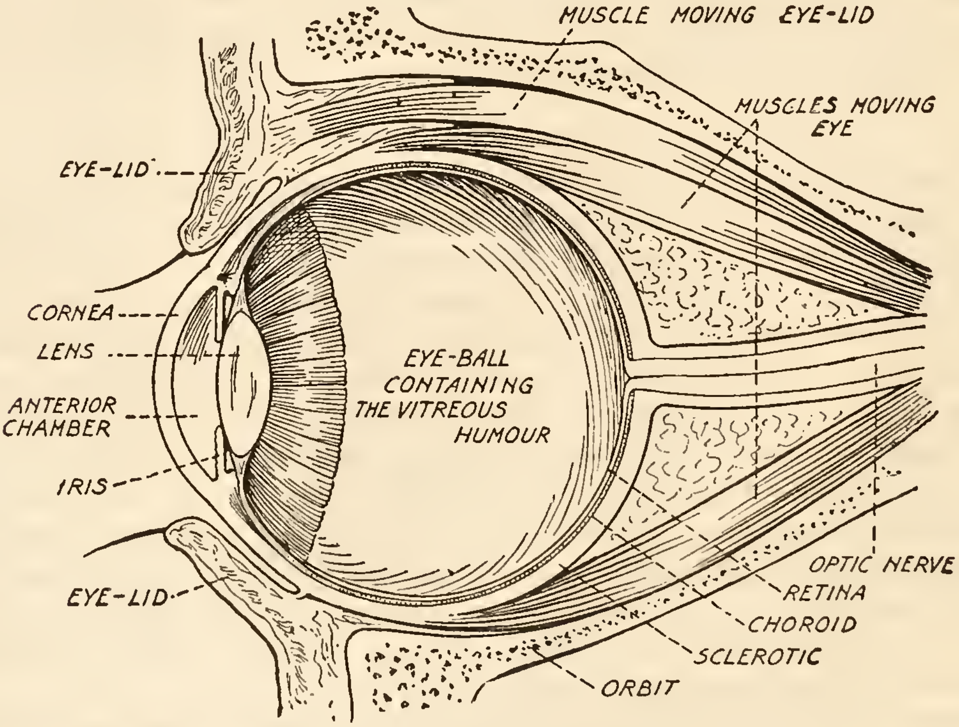


Fig. 43.—Diagram of the Eye.

The movements of the eye are carried out by six small muscles, which are so arranged that they are able to turn it in all directions, and, acting in conjunction with those of the other eye, and under the control of the brain, move the two eyes together. Disease of these muscles produces the various forms of squint. A seventh muscle (Fig. 43), which runs along the roof of the orbit, is attached in front to the upper lid, and fulfils the duty of raising it when the eye is opened.

Muscles of the Eye.

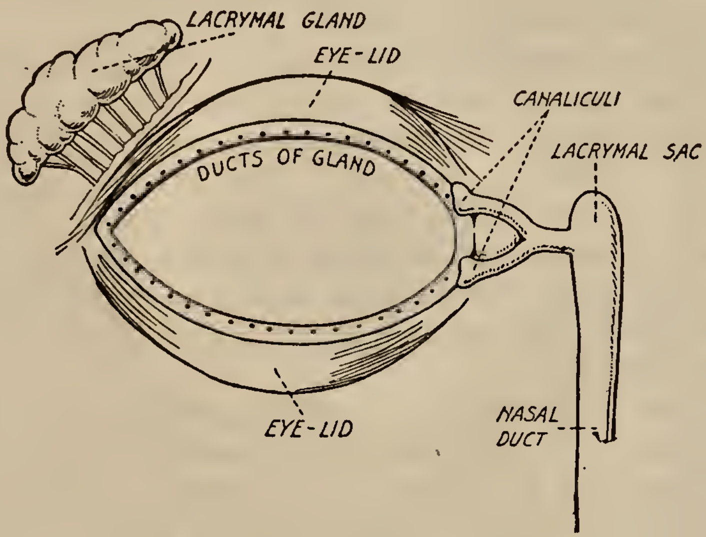


Fig. 44.—THE LACRYMAL APPARATUS.

The eye, held in position by the surrounding muscles and fat, is protected in front by the lids. These consist of a movable fold of skin, the shape of which is maintained by a thin plate of gristle, of muscular fibres arranged circularly, which by their action close the lids, and of a smooth, soft mucous membrane, the conjunctiva, which lines their under surface and is continuous with that covering the whole of the exposed surface of the eyeball. The movements of the lids are excessively rapid, and in the "twinkling of an eye" guard this sensitive organ almost involuntarily against the entrance of an intruder. The eyelashes are arranged along their free edges, and prevent the entrance of foreign particles, and numbers of small glands (the Meibomian glands) are imbedded in their substance, and secrete an oily fluid which renders their movements smooth and easy, and prevents their sticking together.

Eyelids.

At the upper and outer part of the orbit is situated an oval body

Lacrymal Gland.

the size of a small almond, which forms the tears, and is called the lacrymal gland (Fig. 44). It secretes a watery fluid, which is squeezed out every time the eye winks, and flows over the surface of the globe, washing away any particles of dirt. The fluid finds its way to the inner corner of the eye, where it passes into two minute openings, one at the edge of each lid, which are plainly seen if the lids are turned slightly outwards. These lead into a duct, along which the tears are carried to the nose. When the fluid is secreted too rapidly to escape down these narrow channels it runs over on to the cheeks as tears.

Eyeball.

The eyeball is composed of three layers or membranes. The outermost one, called the *sclerotic*, is strong and fibrous, covers the whole globe except the transparent portion in front, and forms the "white of the eye." The middle coat, or *choroid*, contains many blood-vessels, and is quite black with granules of pigment; and the inner coat, or *retina*, is a thin, transparent membrane formed of sensitive nerve structures, and is an expansion of the optic nerve, which passes from the back of the eyeball to the brain, and is the special nerve of sight.

The structure of the retina is most remarkable. Its greatest thickness is only about $\frac{1}{50}$ inch, and yet it contains layer upon layer of the most complicated structures. It is backed by a black surface of pigment, and on this lies a layer of minute and extremely sensitive nervous structures called the rods and cones, which are present in many millions, and are the portion of the eye which receives the impressions of light. Besides these membranes, the eye contains certain structures which transmit the rays of light and form a clear and well-focussed picture of the objects seen.

The *cornea*, the transparent structure which forms the front of the eye, is fitted like a watch-glass into a rim formed by the sclerotic, is quite devoid of blood-vessels, and its surface is covered with a thin and exquisitely sensitive layer of the conjunctiva, or mucous membrane.

Behind the cornea is a space filled with clear water, the *aqueous humour*, which extends backwards to the crystalline lens, and is divided into two chambers by the iris. The *iris* is a most interesting structure, that hangs vertically like a curtain in the aqueous humour. It is continuous with the choroid coat, and forms the coloured part of the eye. At its centre there is a circular opening, which forms the pupil. The iris contains two sets of muscular fibres, one set being arranged circularly round the pupil, and the other set being arranged in a radiating direction. The former contract, the latter dilate the pupil, which varies in width from ⅓ to $\frac{1}{20}$ inch. The back of the iris is coated with black pigment, by which the entrance of light is prevented, and its front surface is variously tinted according to the colour of the eye. In blue eyes the colouring matter is absent, and the colour is due to the dark pigment at the back shining through the substance of the iris; in grey, brown, and black eyes it varies in amount, but is abundant, whilst from the eyes of albinos even the black pigment is altogether absent, and the pink colour is due to the light shining through the blood contained in the structure of the iris.

Just behind the iris is placed the *crystalline lens*. This is formed of a perfectly transparent material of the consistence of firm jelly, and arranged in many layers; it is elastic, and is contained in a bag or capsule, which is attached all round to the choroid coat of the eye. The lens is about ⅓ inch in diameter, and its two surfaces are convex, but the back is much more curved than the front.

Behind the lens is another chamber, filled with a soft, jelly-like, transparent substance, the *vitreous humour*, which retains the rounded shape of the eye and keeps the retina in its position at the proper distance from the lens. The eye is provided with a small ciliary muscle, which, when in action, allows the lens to become more spherical by relaxing the structures that control its elasticity.

Like a Camera.

The description of the eye as the organ of sight can best be understood by comparing it to a photographic camera, an instrument which it very closely resembles. The rays of light from an object fall upon the cornea, and some of them are reflected from its surface and give it its beautiful shining appearance. The remainder, passing through it, are converged or refracted. They traverse the aqueous humour without change. On reaching the iris, all the rays at the circumference, and the superfluous light which would render the picture indistinct and blurred, are cut off by its layer of black pigment, and only the central and direct rays reach the lens. The iris in this way acts as the diaphragm, or stop, of a camera, but greatly surpasses this in usefulness, for it can alter the size of the pupil, as required, from that of a pin-hole to the third of an inch, whilst in a camera diaphragms of different sizes have to be used. The pupil is expanded to let in more light, as in a dark room or when looking at dim objects a long way off, and it is contracted in bright lights or when looking at near objects. The far-away look produced by an expanded pupil increases the beauty and depth of the eye, and is sometimes purposely produced for this reason by the use of belladonna, in spite of the interference with vision that results. The movements of the human pupil are involuntary, but in animals that prey by night, as cats and owls, they appear to be under the control of the will, and the pupil can be enormously expanded. Its shape also, in the lower animals, varies, being oblong vertically in cats, and transversely in ruminants.

Having passed through the pupil, the rays of light traverse the lens, which fulfils the same duties as the lens in a camera. It converges the rays and brings them to a focus upon the screen, represented by the retina, at the back of the eye, where it forms a complete picture of the object under observation. It is only when the picture is well focussed on the screen that it can be seen distinctly, and as distant objects are focussed at a different spot from those that are near, some mechanism is required by which the picture may always fall clear and sharp upon the surface of the retina. In a camera the focussing is carried out by moving the lens backwards or forwards until a clear picture is thrown on the ground-glass plate at the back, but as the lens in the eye is fixed some other arrangement has to be devised. A normal eye is so adjusted that all objects distant from it 20 feet or more are clearly focussed, but to accommodate it to see a near object, 1 or 2 feet away, an effort is required. This is carried out by the ciliary muscle, which by its contraction loosens the structures that control the elasticity of the lens; the lens becomes more convex or curved on both its surfaces, but especially the front, and the rays of light are brought more rapidly to a focus, and are concentrated on the retina. When the ciliary muscle ceases to act the lens resumes its natural shape. This adaptation of the eye to vision at different distances is called accommodation, and is a complicated process. In looking from a distant object to a near one, the eyes turn inwards towards one another, the pupils contract, and the lenses become rounder, or more convex; whilst when looking at a distant object again, the eyes return to their original position, the pupils dilate, and the lenses become flatter. In a normal eye, distant vision is limited by the sensitiveness to light of the retina, and near vision by the power of accommodation, which is usually about 5 or 6 inches.

The vitreous humour behind the lens does not affect the passage of the rays of light. The retina, which corresponds to the ground-glass plate of a camera, has a picture of all objects formed upon it, and the picture is upside down; this curious phenomenon in no way interferes with our perception of objects, for habitual mental operation renders us quite unconscious of it. Here the resemblance to a camera ends. In the eye the picture acts on the layer of rods and cones, which are delicate nerve structures, and the impression thus produced is transmitted along the optic nerve to the brain, which at once perceives the object.

In connection with the retina there is another point in which the eye is superior to a camera. The picture formed by the lens in both is slightly curved, and when it falls on the flat ground-glass or sensitive plate the edges are somewhat blurred and out of focus, but on the curved retina it is well focussed throughout. The power of vision is not the same over the whole surface of the retina. It is most acute at its centre, at the point which corresponds to the axis of the eyeball; here there exists a round, yellowish spot, at which the cones of the retina only are present, the rods being entirely absent, and from this outwards towards the circumference of the retina the acuteness of vision grows gradually less.

About ⅛ inch to the inner side of this yellow spot is the point where the optic nerve enters the eye and forms the optic disc; here the retina is quite insensitive to light, and it is therefore called the " blind spot." The portion of every picture which is focussed here is therefore lost, but as the result of habit and experience its absence is unnoticed.

The blood-vessels supplied to the retina enter at the centre of the optic nerve and branch off from this point, and it is possible to see them in one's own eye. If in a darkened room a candle is held a short distance in front and to the outer side of one eye, and moved to and fro whilst the eyes look steadily forwards into the darkness, dark branching lines on a red ground can be seen, which are the retinal vessels. This experiment shows that the sensitive parts of the retina are the rods and cones, for they lie in it behind the blood-vessels, and perceive the shadows that are thrown when the light of the candle shines upon them.

It must be distinctly understood that it is not the eye that sees, but the brain. The eye receives an impression, the meaning of which is interpreted by the brain. Although all objects are pictured upside down on the retina, the brain refers the picture to the external object and projects it outside the eye to its actual position. In the same way the brain guides us in our estimate of the size of objects chiefly by the idea formed of their distance from us. A lofty mountain many miles off we infer to be larger than a small hill near at hand, because we know it is much farther off, although they may form pictures of precisely the same size on the retina. Our judgment may err from this very reason, for persons seen walking on the top of a small hill against a clear twilight sky appear unusually large, because we overestimate their distance. It is by a mental act also that we recognise the forms of objects and know that they are solid bodies and not flat surfaces. The picture thrown on the retina is, of course, perfectly flat, but is different in the two eyes, and the brain is able to combine these, and perceives the object standing out in relief. If a solid body, as a box or cube, be placed at a short distance from the eyes, and be looked at with each eye in turn whilst the head is kept perfectly steady, this fact can be observed, as in Fig. 45, in which A stands for the picture in one eye and B for that in the other. In the stereoscope this phenomenon is made use of to make pictures stand out in relief.

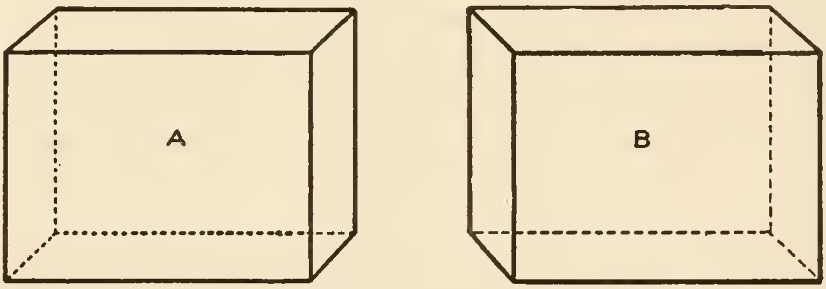


Fig. 45.—How a Box appears to the Two Eyes.

The duration of the sensation produced by a luminous impression on the retina is always greater than that of the impression which produces it. For example, it is possible to see a moving object, as a galloping horse on a dark night, by a flash of lightning; the flash is almost instantaneous, but the impression lasts for an appreciable time. The horse would, however, not be seen in motion, the light lasting for too short a time for any movement to have occurred. This duration of impressions explains the appearance of a revolving wheel, for the pictures of the spokes run into and blur one another, and it is also the reason why the rapid act of winking does not interfere with vision. The retina becomes stamped with the picture, and shows what are called " after-images."

On looking away from a bright window after directing the eyes towards it for some time, an image of it is seen with the lights reversed, the bars appearing as bright lines on a dark ground. A similar phenomenon occurs after gazing fixedly at bright-coloured objects, but the image is then of the opposite or complemental colours. A red object looks green, a green object red; a yellow looks violet, and so on. An image of this kind may be the origin of many ghost-stories, for after looking in the dusk at a dark post or the stump of a tree, and then turning the eyes to a grey sky, a gigantic white image of it will there be seen.

The Ophthalmoscope.

Our knowledge of the causes of blindness and of the diseases of the deeper parts of the eye has been enormously increased by the ophthalmoscope, which was invented by Prof. Helmholtz in 1851. On looking through the pupil with the unaided eye, the whole interior of the globe appears to be black, but if a mirror is employed to reflect light into the eye under examination, and the observer looks through a small opening in the centre of the mirror, he can see the whole of the interior brightly illuminated. With a magnifying glass then held close to the eye, its parts can be magnified, the optic disc and retinal vessels can be seen, and imperfections in the various structures can be recognised.

CHAPTER XXIV

DISORDERS OF THE EYES

Colour-Blindness—Blindness—Amaurosis—Short Sight—Long Sight—Old Sight—Astigmatism—Spots before the Eye—The various Forms of Conjunctivitis (Ophthalmia)—Ecchymosis—Pinguecula—Inflammation of the Cornea and Sclerotic—Glaucoma—Iritis—Cataract—Disease of the Tear Ducts—Squint.

COLOUR-BLINDNESS

THE not uncommon affection called colour-blindness is probably due to an imperfection of the minute structures of the retina. The condition is generally hereditary, and is quite incurable. Although in rare instances total colour-blindness is met with, in which the perception of all colours is absent, yet usually it is the colours red and green that are confused with one another. The danger of this condition when occurring in sailors and railway-men, who are therefore unable to recognise signal lights, is at once obvious.

BLINDNESS

Blindness may be the result of many different conditions. A certain number are born blind, and have no true idea of what the sense of sight signifies. It is said that when a man who was born blind was asked what scarlet was like, he answered, " Like the sound of a trumpet," and the same ignorance was shown by the man in the Scriptures who saw " men as trees walking." One of the commonest causes of loss of sight is inflammation of the eyes (such as affects new-born babies, in whom it is called ophthalmia neonatorum) which has been treated unsuitably or neglected. Any disease which causes opacity of the transparent parts of the eye destroys the sight partially, if not entirely. Especially frequent are affections of the cornea and the lens, the latter being called cataract. Disease of the nervous part of the retina, of the optic nerve, or of the centres of sight in the brain, are all causes of blindness. This affection, partial or complete, occurs as a symptom of many diseases—in disorders of the brain, in megrim, hysteria, and cerebral tumour; in Bright's disease and diabetes; as the result of injuries to the eye; and in poisoning with quinine, alcohol, opium, and tobacco.

Certain persons suffer from peculiar affections of vision called night or day blindness, in which they can only see in very bright or very dim lights respectively. The former is met with chiefly in sailors and in those who have spent much of their time in the glare of the tropics.

Artificial eyes have, unfortunately, to be worn for appearance sake if an eye has been lost or rendered unsightly, and a few words about them may be useful. They are not globes, but thin curved shells of enamelled glass or celluloid which fit over the surface of the eye and are coloured on the front to correspond with the normal eye. They cannot be worn unless the eye has been reduced in size by the removal of the front sensitive portion. The artificial eye should not be worn continuously; it should be removed every night, and carefully cleaned with warm water and a soft cloth. To introduce it, it must be moistened, held with the finger and thumb, its broad outer end introduced beneath the upper lid, and then the lower lid drawn down and slipped over it. It is removed by depressing the lower lid and lifting its edge with the nail into a position where it can fall on something soft.

Artificial Eyes.

AMAUROSIS

This term is applied rather indefinitely to those forms of blindness in which no signs of disease can be discovered in the eyes which is sufficient to account for the loss of sight. "Amblyopia" is the term used for partial loss of sight under similar circumstances. In many cases these expressions simply imply ignorance of the definite cause producing the blindness. Before the discovery of the ophthalmoscope a large number of eye disorders were included under the expression amaurosis, such as inflammation and wasting of the optic nerve, which have since been proved by that instrument to be due to definite and easily recognisable changes of structure in the organ, and the cases of blindness referred to this cause in history would probably nowadays be called by more definite names.

Loss of sight in hysteria is accompanied by no definite change of structure, and takes the form of amblyopia, or impairment of sight.

Amaurosis often follows severe blows on the face, forehead, or temple, from what is supposed to be "jar" or concussion of the retina. It may also come on gradually months after an injury to nerves of the face, especially that situated above the orbit, or in consequence of diseased teeth; it is then considered to be due to interference with the nutrition of the retina through nervous influences. A lightning flash or exposure to the glare of sunlight on snow (snow-blindness) has produced it. Excessive bleeding from any part of the body and anæmia are often accompanied by this symptom, which passes off as the blood is restored to a healthy condition.

But of all forms of amaurosis none is so frequent as those caused by poisons in the system, such as urea (in kidney disease), lead, quinine, alcohol, opium, and tobacco. In the case of tobacco poisoning the affection gradually develops in both eyes, forming a central blind patch, and is peculiar in being especially developed in connection with colours, red and green particularly. These poisons act on the nervous structures of the retina.

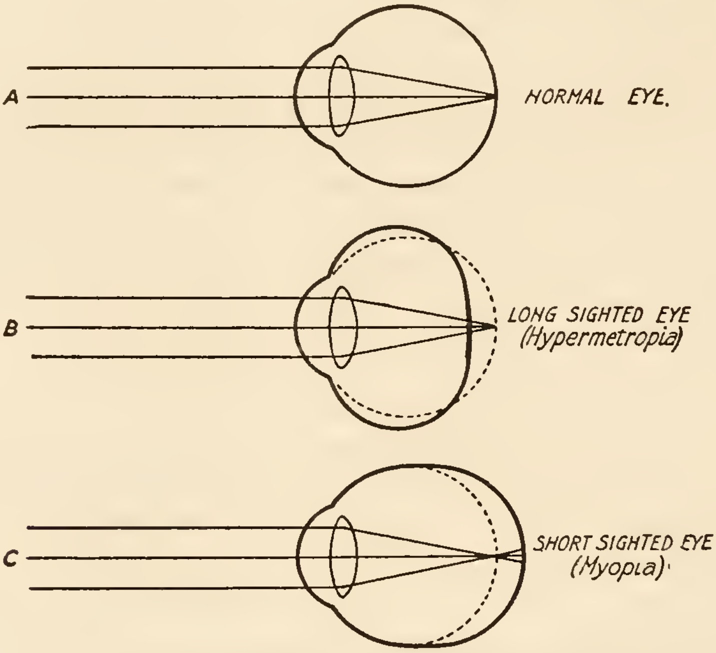


Fig. 46.—NORMAL, LONG-SIGHTED AND SHORT-SIGHTED EYES.

The treatment of amaurosis is limited to the removal of the cause, when this can be recognised, as in the case of poisons. It is not relieved by the use of spectacles.

SHORT SIGHT

It has been stated that in a natural eye all objects at a greater distance than 20 feet are brought to a focus by the lens without the action of any of the eye muscles. In short-sighted people, however, the eyeball is longer from back to front than natural (Fig. 46, c). The consequence is that the picture is focussed in front of, instead of on, the retina, and it is only by a great effort of the ciliary muscle that it can be focussed on the retina itself. The abnormal shape of the eye is sometimes present at birth, but short sight is often acquired by overuse or misuse of the eyes. All conditions which cause excessive eyestrain —such as very fine work, long hours of reading, very small print, especially if the head is bent down or the light is bad—are liable to produce the acquired form of short sight. The back of the eyes becomes congested and inflamed, and the affected parts bulge backwards and increase the length of the eyeball. Short-sighted eyes are usually large and prominent, and their pupils are often much dilated.

Symptoms.

The symptoms do not come on, in most cases, until the age of from seven to fifteen years, and in slight degrees of short sight may not arise at all. But in the more serious cases the sufferer complains of being unable to see distant objects plainly, and of having to hold near objects—needlework or a book, for example —inconveniently close. After using the eyes for a time they become painful, watery, and sensitive to bright light; the vision is dim and indistinct, and there is headache. Spots before the eyes are common from changes in the vitreous humour and retina, and the latter structure may become seriously damaged if care is not taken of the eyes and proper treatment adopted. An outward or divergent squint is liable to develop also if the case is neglected.

Treatment.

Short-sighted children should not be allowed to continue to use their eyes after these begin to ache; their hours of work should be carefully limited; they should only be permitted to read well-printed books, and in a good light, and without bending down the head. If the trouble still continues, all work should be interdicted for some months. The pain and watering of the eyes may receive some relief from the use of smoked glasses. The disorder is likely to grow worse from its first appearance to the time when the growth of the body ceases; it then remains stationary for years, perhaps increasing from overuse of the eyes or when the general health of the body is impaired by a severe illness. Late in life, as the natural changes of old age occur, the sight may slightly improve, and the spectacles which once were necessary may be discarded.

As the unnatural shape of the eyes is incurable, short sight must be treated with spectacles, which should be of the double concave variety (Fig. 47, A), thinner at the centre than at the edges. These should be very carefully chosen, for if glasses of the wrong strength are used they may be the means of aggravating instead of relieving the trouble. The glasses act by making the rays of light which enter the eye more divergent, so that the picture is thrown farther back in the eye. They will be required to look at distant objects, and in high degrees of short sight a second pair may be necessary for reading. It is better to wear them for the latter purpose, for reading can then be done without stooping or holding the book very close. It is of great importance that the eyes should be examined and the strength of the glasses prescribed by an oculist, for much danger is run by buying them at an optician's without skilled medical advice.

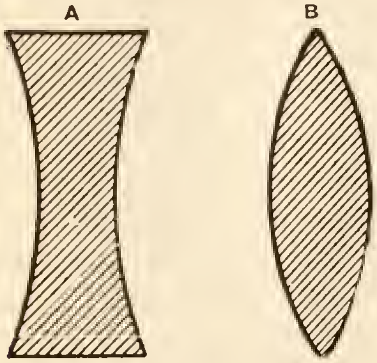


Fig. 47.—A, Double Concave, B, Double Convex Glass.

LONG SIGHT

In long-sighted people the eyeball is shorter than normal (Fig. 46, B), and the rays of light meet the retina before they have reached their focus, and the result is that everything appears blurred and indistinct. It applies to distant as well as near vision in advanced cases, but in slighter forms, by muscular effort, the eye may be accommodated to distant objects and see them clearly. The condition is present at birth, but its results vary with the patient's age. In childhood it may be unrecognised and give no trouble, but when reading, writing, and sewing form part of the daily routine it soon makes itself evident, especially when these things are done in artificial light. Frequently after a long day's or week's work, when the body is fatigued and the muscles are exhausted, the symptoms show themselves with great severity. They consist in mistiness of sight, watering and painful eyes, headache and sleepiness. An inward or convergent squint is often developed, at first affecting both eyes in turn, but finally settling in one eye, which is then not used for vision, and to this extent is a blind eye.

Symptoms.

Treatment.

The proper way to treat this condition is to wear convex glasses (Fig. 47, B), which, by bringing the rays of light together more quickly, focus them on the retina without strain. They will relieve all the symptoms unless the case has been much neglected, will prevent the formation of a squint, and will cure it so long as it remains alternating in the two eyes, but when it has settled in one an operation is necessary. In children the glasses should be worn always, but in adults who have but slight degrees of long sight they may be worn for reading only.

OLD SIGHT

The power to accommodate the eyes to objects at varying distances gradually grows less as age advances. At ten years of age an object can be seen distinctly at 3 inches, at twenty at 4 inches, at forty-five at 10 inches, whilst at sixty not nearer than 3 feet. This is due to a hardening and loss of elasticity in the crystalline lens, which prevents the alteration of shape that accommodation requires. When the shortest distance at which distinct vision is possible approaches that at which reading or work is usually attempted, it attracts attention; the book has to be held farther away, and a better light is required. The condition is perfectly natural after forty-five years of age, and does not indicate the presence of disease. Long-sighted people suffer from it at an earlier age than short-sighted, and very short-sighted persons may never be troubled by it at all.

Treatment.

Treatment consists in wearing convex glasses (Fig. 47, B), which converge the rays and bring them more rapidly to a focus. The strength of the glasses should be such that the patient can read with them without straining the eyes at a distance of from 12 to 15 inches, and their power should be gradually heightened as age advances, to make up for the increasing loss of power in the eye. As it is usually necessary to hold the book nearer the eyes in artificial light, it is advisable to have a stronger pair of spectacles for evening use.

ASTIGMATISM

Another condition which requires glasses for its relief is called astigmatism. It consists in an irregularity in shape of the cornea, its curvature being greater in one direction than in others. As a result the picture of objects is blurred and indistinct. It is present in nearly all eyes to a slight extent, and can be shown to exist, if in any marked degree, by looking at black lines on white paper; the lines in one direction are seen clearly, while those at right angles to them appear blurred and indistinct. The glasses required for the correction of this defect can only be ordered by a specialist.

SPOTS BEFORE THE EYES

A very common disorder of the eyes is that of spots floating before them. These are technically called " muscæ volitantes," which means " floating flies." In attacks of megrim or sick headache they are the result of nerve disturbance, and are not due to any affection of the structures of the eye. But the most common appearance is that of thin films or semi-transparent threads, dots or circles which float before the eyes after a sudden movement of the organs and gradually settle down if the eyes are kept still. They are seen with the eyes shut as well as open. In these circumstances they are of no importance, and are simply due to the presence of tiny particles in the fluid which bathes the surface of the eye, or they may be the natural structure of the vitreous humour itself. They are far more common in short-sighted eyes, and are seen most readily against a white wall or cloud.

When, however, there are one or more spots which are still, permanent, and always seen in the same place, there is more reason to think they may be of serious import. They may then be due to an opaque patch on the cornea; to an adhesion of the iris to the front of the lens, which may have been formed during a past attack of iritis; or to an opacity of the lens, which signifies a commencing cataract. In such a case it would be wise to consult an eye specialist, and obtain the necessary directions for treatment. The floating spots neither require, nor are capable of, treatment, but if they cause real inconvenience some relief may be obtained by wearing coloured glasses.

Inflammation of the Conjunctiva

The chief affection of the conjunctiva, or mucous membrane of the eyelids and front of the eye, is inflammation, and as this assumes various forms it will be necessary to describe it under separate headings: (1) simple or catarrhal conjunctivitis, (2) phlyctenular or pustular conjunctivitis, (3) purulent or contagious conjunctivitis, (4) chronic or granular conjunctivitis, (5) diphtheritic conjunctivitis, and (6) sympathetic ophthalmia. " Ophthalmia " is used with practically the same meaning as " conjunctivitis."

1. SIMPLE CONJUNCTIVITIS

This is the common affection referred to as " a cold in the eye." It is produced by cold or by the irritation of a foreign body. Cold is more likely to set up an attack in persons of rheumatic tendencies and in those who have had previous attacks. Strain of the eyes, as by their prolonged use in a close atmosphere or in the heat of a lamp or fire, is a common cause, but the trouble sometimes comes on without our being able to trace the cause.

Symptoms.

The eyes become bloodshot and painful; they are sensitive to light, and "watery"; a gummy discharge forms, which sticks the lids together so that they can with difficulty be opened in the morning. The lids become irritable, and itch, and feel gritty as if there were sand or dust in the eyes. Both eyes are usually attacked, although the cold may begin in one before the other. The discharge in these cases is simply mucous and sticky, and does not tend to become mattery. The sight is not affected, for the cornea remains free from inflammation. The redness in conjunctivitis is best seen by turning outwards the lower lid, when it is found to be most marked at the part where the conjunctiva passes from the lid to the globe of the eye, and at the caruncle or small red body at the inner corner. This fact is useful in distinguishing between inflammation of the conjunctiva and of the sclerotic. The latter is far more serious, and in it the redness is most marked in a ring around the cornea. Other points of difference are that the redness of conjunctivitis is formed by distinct vessels forming a network, and that pressure upon these through the under lid causes the redness temporarily to disappear and shows the whiteness of the sclerotic through, while redness of the sclerotic is not removed by pressure, and forms a general red colour in which the separate vessels are too small to be distinguished. In conjunctivitis the small blood-vessels are liable to give way and pour out blood, thus causing red blotches of various sizes. The pain is not very severe, but gives a sensation of weight and stiffness to the lids.

Treatment.

The treatment of simple conjunctivitis should be commenced by a careful search for any foreign body—dust, dirt, or an eyelash—and its removal when found. The general health should be attended to, the bowels cleared, and the digestion improved. The various exciting causes and all forms of irritation should be carefully avoided. To soothe the inflammation nothing is better than frequent bathing with a lotion of one teaspoonful of boracic acid to a pint of warm water; cold tea, or 3 grains of alum to an ounce of water, may also be used. The eyes should not be bound up with wet cloths or poultices, but should be rested and sheltered from cold, dust, and glare. The acute attack usually subsides in a few days without leaving any ill effects, but if it does not some astringent eye-drops should be added to the treatment. Sulphate of zinc, 1 grain to 1 ounce of water, or a 5 per cent. solution of argyrol, should be obtained. The eyes should be washed with the boracic lotion, and then two or three drops of either of these solutions should be placed on the turned-back lower lid twice or thrice a day. The addition of 10 grains of cocaine to the zinc lotion lessens the smarting. A little vaseline or simple ointment should be spread along the edges of the lids at bedtime to prevent them from sticking together.

2. PUSTULAR CONJUNCTIVITIS

In this form of inflammation of the conjunctiva, phlyctenules, or peculiar little red raised patches with a whiter centre, form close to the edge of the cornea and to one or the other side of it, and running up to them a leash of little vessels can be seen. It is a common complaint in children and young people, and is sometimes (but not always) accompanied by much pain, sensitiveness to light, watering of the eye, and blinking of the lids. The general health is usually much deranged, and the disorder commonly comes on in children debilitated by a recent illness. One of the chief steps in treatment is, therefore, to give tonics, such as iron and cod-liver oil, nourishing diet, and daily fresh air and exercise. The eye-drops recommended for simple conjunctivitis should be placed in the eyes twice daily after washing with the boracic lotion. A highly esteemed remedy in these cases is a few granules of powdered calomel, which can be applied to the spots with a soft brush, or flipped into the eye from a piece of paper. The eyes should not be tied up, but covered with a light shade. If the pain is very severe the patient may have to be kept in a darkened room for a few days, but the sooner he can get out into the fresh air the better.

Treatment

3. PURULENT OPHTHALMIA

Similar in character but much more active and dangerous than the forms of conjunctivitis already dealt with is the disease called purulent ophthalmia. It is caused by the inoculation of the eye with certain germ-containing discharges, by which it can be transmitted from one person to another. For this reason it is sometimes called contagious ophthalmia. It spreads rapidly where large numbers of persons are congregated, as in barracks or schools. The discharge is conveyed by the fingers, by towels or rags used by the affected person, and, it is said, by flies.

Symptoms.

The general symptoms are severe, and the patient feels ill and feverish. The local symptoms are great swelling of the eyelids so that it is impossible to separate them, severe burning pain, and, after the first day or two, a profuse mattery discharge which forms thick crusts on the eyelashes. If the conjunctiva can be seen, it is found to be bright scarlet and swollen, and the swelling may be so extreme as to overlap the edge of the cornea, a condition with which the great danger of this disease is connected, for ulcers are very liable to form on the cornea, which may become opaque or even perforated, causing serious interference with the sight, and occasionally complete blindness.

Treatment.

Such cases should never be treated without the supervision of a medical man, for the requisite measures are very difficult to carry out, and the result of imperfect treatment may be disastrous. It is necessary to cleanse the whole of the inflamed conjunctiva constantly with an antiseptic lotion, using either boracic acid, one teaspoonful to 1 pint of warm water, or corrosive sublimate lotion, 1 in 2,000 of warm water. This should be carried out every hour in the day and several times at night. The lids should be separated with the finger and thumb, as gently as thoroughness will permit, and the lotion poured well into the eye with a syringe, a douche apparatus, or, if nothing better offers, from the spout of a well-cleaned teapot. The washing should be followed by the use of a few drops of a 25 per cent. solution of argyrol, and the head should be held so that the drops run well under the upper lid.

It can be easily imagined how difficult this is to carry out when the patient is a child, especially considering the painful state of the eyes. The child must be laid on his back, and his head held firmly between the knees to prevent movement. Clean rags and cotton-wool should be employed to wipe the eyes, rather than towels, and they should be burnt immediately after use, and the hands thoroughly washed. Towels, sponges, etc., should be kept specially for the patient's use. The edges of the eyelids should be smeared with lanoline or vaseline after each washing to prevent them from sticking together.

This affection is unfortunately very frequent in new-born babies, and is called " ophthalmia neonatorum " (ophthalmia of the new-born). It is said that half the blindness of Europe is due to the neglect and unsuitable treatment of this disease, which is dealt with in the section on Children's Diseases.

4. GRANULAR OPHTHALMIA

This, the chronic form of ophthalmia, is characterised by the formation of a number of little raised bodies the size of a pin's head, which are semi-transparent, and have been likened to "sago grains." They form in the mucous membrane of both lids, especially the upper, and can be easily recognised by drawing down the lower lid. The complaint is very likely to break out in epidemic form in large schools or public institutions, and is transmitted from child to child by the discharge from the eyes. It is encouraged by overcrowding, bad ventilation, and neglect of hygienic conditions. The granulations rub against and irritate the cornea, and are liable to set up inflammation in it, which runs on to opaque spots and ulceration, and greatly impairs, or even destroys, the sight of the eye. It may also lead to contraction of the lids with deformity, in which the lashes are either turned outwards away from the eye, so that the tears flow over the cheek instead of draining off into the nose, or are turned inwards, so that the lashes rub against and irritate the surface of the eye.

The disease is most chronic, lasting sometimes for months or years. It is not suitable for domestic treatment. The cases must be isolated to prevent infection, and the eyes should be protected from light until seen by a doctor, who will probably have to use strong caustic applications to destroy the granulations.

Treatment.

5. DIPHTHERITIC CONJUNCTIVITIS

The diphtheria bacillus sometimes attacks the conjunctiva and forms a membrane on it, but the affection is not of common occurrence. It has to be treated by the same means as diphtheria in other parts.

6. SYMPATHETIC OPHTHALMIA

In cases of injury affecting the globe of one eye, inflammation is sometimes set up in its fellow, and the disease in the previously healthy eye is called sympathetic ophthalmia. It may occur at any time, from a fortnight to many years, after the original injury. It is of great importance to know the early symptoms, for the affection comes on very gradually, and yet may end in total loss of sight; they are sensitiveness to light, watering of the eye, and dimness of vision for near objects. The eye also which was originally affected becomes irritable and tender. If such symptoms show themselves a surgeon should at once be consulted, for the trouble can be checked whilst in the early stage by the removal of the wounded eye. The cause of the complaint is believed to be absorption of poison from the original injury.

Having thus noticed the various forms of conjunctivitis or ophthalmia, we pass on to

ECCHYMOSIS

Under certain circumstances, a bright red patch of uncertain size forms over the white of the eye, and may cause great alarm. It is, however, quite unimportant, though very unsightly; it is produced by the rupture of a small blood-vessel and hæmorrhage from it under the conjunctiva. It is caused by some violent effort, as sneezing or vomiting, and is not uncommon in children during whooping cough; occasionally, however, it occurs without any assignable cause. It will gradually disappear in the course of a few days, and its departure may be hastened by bathing the closed eye with cold water, or by applying to the closed lids a compress wetted with lead or spirit lotion.

PINGUECULA

Another peculiar condition is that of small, yellowish, raised patches on the white of the eye on one or both sides of the cornea. They are formed of fat, and are chiefly met with in those who have been much exposed to the weather or who have lived in hot climates. They are quite harmless, and never grow over the cornea or affect the sight.

INFLAMMATION OF THE CORNEA

Children and young persons under twenty are those chiefly affected by inflammation of the cornea, especially if they are debilitated and anæmic. It is far more serious than conjunctivitis, as the cornea is one of the transparent structures through which light has to pass, and the chief cause of anxiety in this complaint is the fact that inflammation tends to make it opaque by causing white patches to form, which much interfere with the clearness of vision.

This affection causes extreme pain and sensitiveness to light, with an abundant flow of tears. Occasionally small ulcers form, from destruction of the surface of the cornea, and leave, as they heal, "corneal opacities," which take weeks or months to disappear, and are in many cases a permanent disfigurement and obstruction to vision.

Treatment.

As this disorder is particularly prone to affect those who are in bad health or who are ill fed, attention should first be directed to toning up the system with good food, fresh air, and healthy surroundings. Although no drug will cure the complaint, much assistance may be derived from administering a tonic mixture containing iron, or by giving dessertspoonful doses of equal parts of cod-liver oil and steel wine after meals. Bandages and compresses over the eyes must not be used, nor must the patient be kept in a darkened room, unless the pain in the eyes is very severe; a light shade may be worn as a protection when out of doors. The eyes must be rested, and not used for reading or work. Frequent bathing with warm boracic acid lotion (one teaspoonful to one tumblerful of water) will be found soothing, and tincture of iodine or blistering fluid should be painted on the temples, so as to keep up a slight soreness and act as a counter-irritant. No astringent lotions or drops should be used. The complaint is a tedious one.

INFLAMMATION OF THE SCLEROTIC

The sclerotic is comparatively free from disorders, but it occasionally becomes inflamed. It is seldom affected alone, but is involved in the spread of inflammation from the iris or the cornea. It then shows the condition described under Simple Conjunctivitis (p. 52), with great sensitiveness to light, watering of the eye, severe throbbing neuralgic pain, and symptoms of fever.

Treatment.

Rheumatism is a predisposing condition, but it is important to know that many cases are developed in the early stages of glaucoma (*see* below), and that then the treatment for that affection is urgently required. In the rheumatic cases the bowels should be well opened, a small dose of tincture of opium (10 drops) being taken to relieve the pain, combined with a gout mixture containing colchicum wine 15 drops, iodide of potash 3 grains, and bicarbonate of potash 15 grains, with 1 ounce of water, three times a day. A diet suitable for gout must be adopted, and the eyes shaded from light and steamed over a jug of hot water.

GLAUCOMA

This disease is not suitable for domestic treatment, but its results are so disastrous if it is not recognised early that it will be advisable to know its premonitory symptoms so that medical advice may be obtained without delay.

Symptoms.

One of the commonest of them is an occasional attack of dimness of sight and the appearance of coloured rings or halos when looking at the light of a candle or gas-jet. Between the attacks the sight is perfectly good, and although they may have continued for many months no sign of disease may be visible in the eyes, or, at any rate, only a little redness or watering; but they become more frequent, and last longer, until finally the sight is permanently impaired. Often there is much pain in and around the eye, and the globe is always much harder than in health, although it is difficult for the untrained touch to perceive that it is so. The pupil has a peculiar appearance, being larger than natural, and fixed even in bright light. The cornea grows dim and like ground glass, and the white of the eye bloodshot. The disease is very likely, from its slow progress, to be overlooked or misinterpreted, some cases being looked upon as biliousness on account of the pain in the head, the sickness, and feeling of illness which accompany the attacks, the consequence often being neglect of the case until the sight is permanently destroyed.

The affection is so serious that, if it is suspected, the eye should be at once examined by an ophthalmic surgeon. In the meantime, and in the early stage, relief may be obtained by giving the eyes complete rest, improving the general health, and the use of eserine drops twice daily. This is a preparation from the Calabar bean, which has the effect of contracting the pupil. Belladonna or atropine drops are not only useless in this complaint, but are actually injurious, and only aggravate the symptoms. A surgeon can give relief, and in many cases effect a permanent cure, by an operation on the eye—iridectomy—in which a portion of the iris is removed. Removal of the sympathetic nerves in the neck, and the application of electricity and of adrenalin, are also said to cure the complaint.

Treatment.

IRITIS

Inflammation of the iris, or coloured part of the eye, is one of the complications of a severe blow or other injury to the eye. It also occurs as one of the results of constitutional diseases, the two most common being syphilis and rheumatism.

The affection is not easy to recognise, and is certainly not suitable for domestic treatment if medical aid can be obtained; it is well, therefore, to be acquainted with the symptoms, so that skilled advice may at once be got. The eye becomes painful and tender to pressure, the pain being seated deeply in the eyeball; it is also "bloodshot," the redness being chiefly in the form of a ring on the border of the white of the eye, close to the cornea; the sight is dimmed and indistinct, and the pupil is altered in size, shape, and

Symptoms.

colour. The change in the appearance of the eye is a symptom of much importance; the inflammation of the iris causes a contraction of the pupil, an irregular shape, and a muddy colour, and the inner free edge of the iris very often sticks to the surface of the lens, and by these " adhesions " may cause a permanent interference with vision.

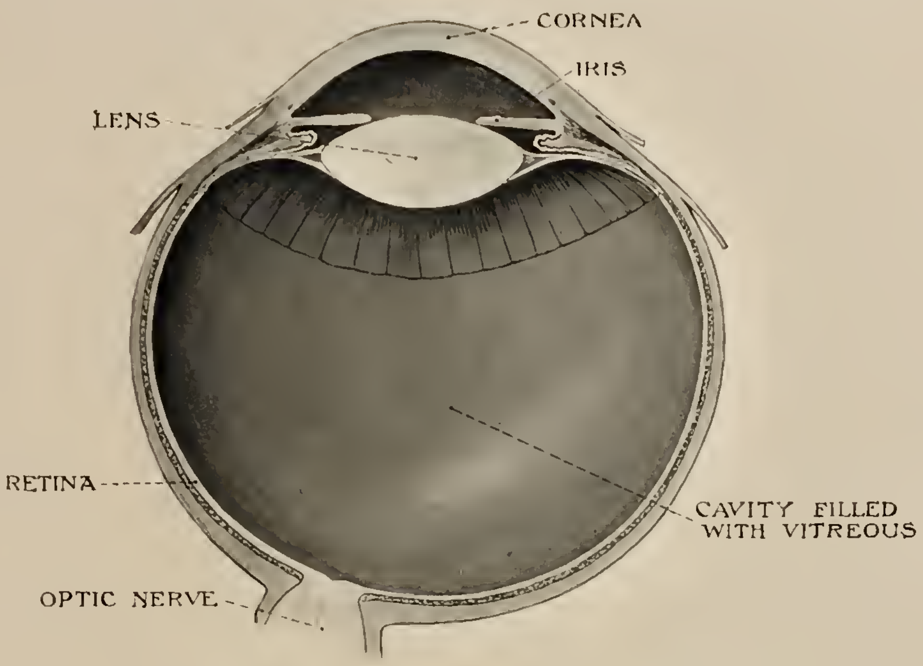
As we have already said, iritis should be under the care of a doctor. Both eyes should be shaded from light and completely rested; the affected pupil should be dilated by the use of atropine solution, 2 or 3 drops being placed in the eye, or some extract or ointment of belladonna smeared on the lids. By dilating the pupil the iris is drawn away from the lens, and the formation of adhesions prevented. Unfortunately this drug is injurious in glaucoma (p. 58), and there is difficulty in distinguishing between the two diseases. The internal treatment is of less importance. When the attack is the result of cold, or a rheumatic tendency is present, salicylate of soda (10 grains) should be taken, or colchicum wine (10 drops) with iodide of potash (3 grains), the doses being repeated three times a day. If syphilis is the cause mercury must be employed.

Treatment.

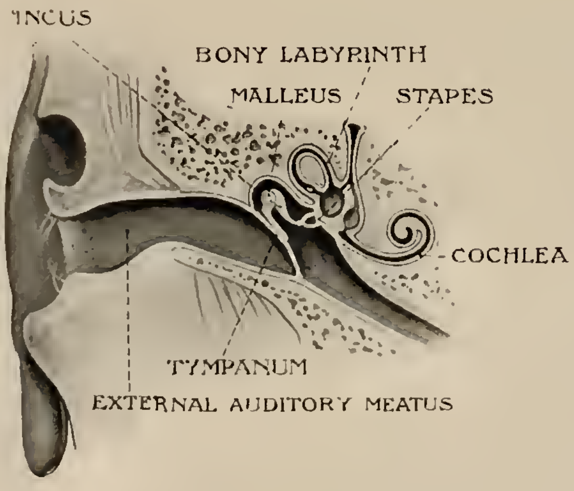
CATARACT

The chief disease of the lens, cataract, consists of an opacity or milkiness of its transparent structure. The whiteness can be distinguished, by a careful examination, from those formed in the cornea, for it can be seen to be situated behind the pupil. A good idea of a lens affected with cataract is obtained from the lens of a fish's eye which has been rendered opaque by boiling. Some cataracts are present at birth; others are caused by injuries to the eye, or by inflammation spreading to it from other parts; some are formed in the disease called diabetes, but the majority come on gradually as age advances, and the affection is then but an exaggeration of the natural degenerations attending old age. The condition gives rise to no pain, but gradually produces blindness. Even the most advanced cataracts do not, however, prevent the patient from distinguishing light from darkness.

No drugs have any effect on cataract, and the only means of cure is by operation, the opaque lens being removed from the eye. It is often necessary to wait for a long time until the lens is ripe for removal. One eye should be subjected to operation at a time. After operation a fair amount of sight can be obtained by the use of suitable convex glasses in different strengths for near and distant objects.

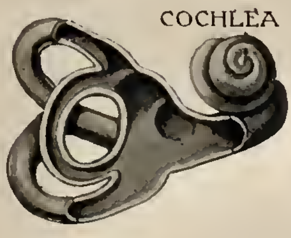


HORIZONTAL SECTION OF RIGHT EYE.



SECTION OF RIGHT EAR.

TYMPANUM.



RIGHT BONY
LABYRINTH.

THE EYE AND THE EAR.

DISEASE OF THE TEAR DUCTS

In a healthy state the openings of the little tear ducts touch the eye, and all the fluid which collects at its inner corner runs away through them without overflowing the lid in the form of tears. When the eye becomes inflamed or irritated, however, the lacrymal gland secretes fluid so rapidly that the drains prove too small, and the eye waters. This complaint, known as "a watery eye," or epiphora, is a common trouble, and is caused by other conditions besides an increased secretion of lacrymal fluid. When the eyes have been frequently or long inflamed the lids become thickened, and the openings of the ducts are displaced and turned away from the eyes, and as a result the tears do not pass into them, but flow over the cheek. If the treatment advised for conjunctivitis is unsuccessful, it may be necessary for a surgeon to slit up the ducts with a fine knife, so that the tears may find an entrance to the drain lower down, and then all is well. The little ducts also may be altogether blocked, and then slitting them open is necessary, and cures the trouble.

Causes.

A similar affection is not uncommon in old people, in whom the lid becomes turned out through weakness of the orbicular muscle. This condition is difficult to treat, but may be much relieved by painting the lower lid with flexile collodion, which tightens up the skin, or by supporting it with a small strip of isinglass plaster.

But a "watery eye" is also produced by an obstruction farther down the drain, either in the lacrymal sac or in the nasal duct beyond it. Knowing that the lining of these passages is continuous with the conjunctiva of the eye and the mucous membrane of the nose, and that both are very liable to become inflamed from cold or injury, we can easily understand that the lacrymal passages also may become affected, and that the swelling of the lining thus produced may easily block up the passages. If the little ducts are blocked the tears will run over the cheek, but if it is the lacrymal sac or the nasal duct that is closed, the tears will pass into the sac, and there collect and form a swelling to the inner side of the eye.

The seat of the obstruction can be fairly easily discovered. If pressure of the finger on the lacrymal sac, which lies below the inner corner of the eye, causes the tears to flow back into the eye, it shows that the canaliculi are free, and that the nasal duct is blocked. But if the pressure on the swollen sac, directed rather downwards, drives the fluid onwards, it shows that the nasal duct is only partially closed, and that the fluid has been forced through it into the nose.

This is a serious condition, for if the tears are not constantly pressed onwards the lacrymal sac becomes distended, inflammation is set up, and matter forms—an abscess of the sac. The part becomes painful, the eyelids red and swollen, and the eye cannot be opened. The sac feels hard and very tender, and if treatment is not employed without delay the matter will burst through the skin and discharge itself, and an opening will be formed through which tears will trickle over the cheek.

Treatment.

Directly a "watery eye" occurs the cause should be sought, and the treatment for a foreign body, conjunctivitis, etc., employed according to the case. The inflammation produced by obstruction of the duct in the early stage must be relieved by frequent bathing with warm boracic lotion (1 teaspoonful of boracic acid to 1 pint of water), and the use of either of the following astringent drops:—

PRESCRIPTION 131

Alum . . . . 1½ grains.
Distilled water to ½ ounce.
3 or 4 drops to be placed in the eye every 3 hours.

PRESCRIPTION 132

Argyrol . . . . 10 grains.
Distilled water to ½ ounce.
2 or 3 drops to be placed in the eye every 3 hours.

If the lacrymal sac becomes swollen it should be emptied into the nose by gentle pressure every two or three hours, before each application of the drops. At this stage it would be wise to consult a doctor. If, however, the domestic treatment has to be continued, and the condition grows worse and inflammation is set up, a warm compress of lint soaked in boracic acid lotion (as above) covered with oiled silk should be applied, and the bathing and drops continued.

SQUINT

Strabismus, or a squint, is a condition in which the two eyes do not work together, nor look at the same point. As they move they are not turned in exactly the same direction. Babies are sometimes born squinting, but this is rare, and when it occurs is due to some serious affection of the muscles of the eye; but this must not be confounded with the somewhat squinting appearance of most young babies, which is simply due to imperfect control over the eye muscles. Most commonly a squint is first noticed between the ages of five and nine, but it has probably existed some time before attracting attention.

The deformity is due to loss of power in one of the muscles which move the eye. If the eye is turned inwards towards the nose the squint is called convergent, if outwards to the temple it is divergent. Occasionally it is difficult to tell which eye it is that squints, and this may be because first one is affected and then the other. Finally, however, the deformity becomes fixed in one eye. The natural effect of a squint is to make the child see double, but this is overcome by learning to look with one eye only, and the squinting eye becomes practically a blind one. In young children squint is often the result of irritation of the digestive organs by unsuitable foods or intestinal worms, and is not uncommonly one of the troubles of teething. In these cases the affection is but slightly marked, is only present occasionally, and occurs first in one eye and then in the other. It entirely disappears when its cause is removed.

Causes.

The most common squint is that in which the eye turns inwards (the convergent), and in the great majority of cases this is set up by long-sightedness, which causes a strain to be thrown on the eye muscles whenever a near object is looked at. The outward squint, much rarer, is also caused by imperfect sight, the trouble being short-sightedness. Occasionally a squint follows inflammation of the eye and the formation of a white patch or corneal opacity in the centre of the line of vision, the eye being turned to one side so as to see through a clear part and avoid the opaque patch. The most serious, though fortunately rare, forms of squint are caused by disease of the brain, such as " water on the brain," tumour, or meningitis.

Treatment.

It is of great importance to recognise the existence of the affection as early as possible, for in those cases which are caused by imperfect vision the trouble can be arrested, and a complete cure often obtained, by the use of proper spectacles. If it be neglected it is sure to grow worse, and a stage is reached when spectacles are useless, and an operation has to be performed, which consists in the division of the defaulting muscle.

Squints developed in later life are due to paralysis of the muscles, produced by quite distinct conditions. Alcoholic intoxication or brain trouble may cause a temporary squint, syphilis a permanent one.

CHAPTER XXV

THE EAR

External Ear—Auditory Passage—Drum—Middle Ear—Internal Ear—Vestibule —Semicircular Canals—Cochlea—Organ of Corti.

THE ear is the organ of hearing, and for convenience in description can be divided into three parts: (1) the external ear, (2) the middle ear or tympanum, and (3) the internal ear or labyrinth.

External Ear.

The external ear is formed of a flap of skin stiffened with gristle, and is shaped so that it may collect and concentrate the waves of sound. It is supplied with a number of muscles, which have become practically useless since civilised man has ceased to " prick " or flap his ears. Some persons are still capable of moving their ears slightly, but they cannot, like many of the lower animals, direct them towards the source of sounds. The external ear includes the passage which leads inwards into the bones of the skull, and is separated from the middle ear by the tympanic membrane, popularly known as the ear-drum. The auditory passage, or meatus, is directed somewhat forwards, and is about an inch and a quarter long. It is narrowest at about the middle, and on this account the extraction of foreign bodies pushed into it often gives much trouble. These parts are firmly fixed to the skull, and will even bear the whole weight of the body; they are well supplied with nerves, some of which are closely connected with those which go to the stomach, lungs, and jaws, and are of particular interest in that they help to explain some of the mysterious symptoms which occasionally accompany ear disease. Sometimes a most troublesome and persistent cough which has resisted all forms of treatment entirely disappears after the removal of a piece of hardened wax from the ear passage, and attacks of constant sneezing or prolonged vomiting have only ceased after the extraction of a foreign body from the ear, the explanation being that these substances have irritated the nerve, and the effect has been transmitted along it to the nerves of the air passages or stomach. The nerves of the ears are also closely associated with those of the teeth, and the connection of toothache and earache is thus explained. One nerve which is connected with that supplied to the stomach has been called the "alderman's nerve," and it is said that moistening the back of the ear with champagne or rose-water after a good dinner is refreshing and stimulates the digestion by its action on this nerve.

The orifice of the auditory passage is furnished with a number of bristly hairs, and the skin lining it has numerous small glands, which secrete the waxy substance called cerumen. Both the hair and the wax protect the drum from the entrance of small insects or hard particles. There are also many sebaceous or oil-forming glands, which are liable to become inflamed and form small, excessively painful abscesses. The joint of the lower jaw is close to the front wall of the passage, and is the explanation of the pain caused by the movements of eating when there is inflammation of the ear.

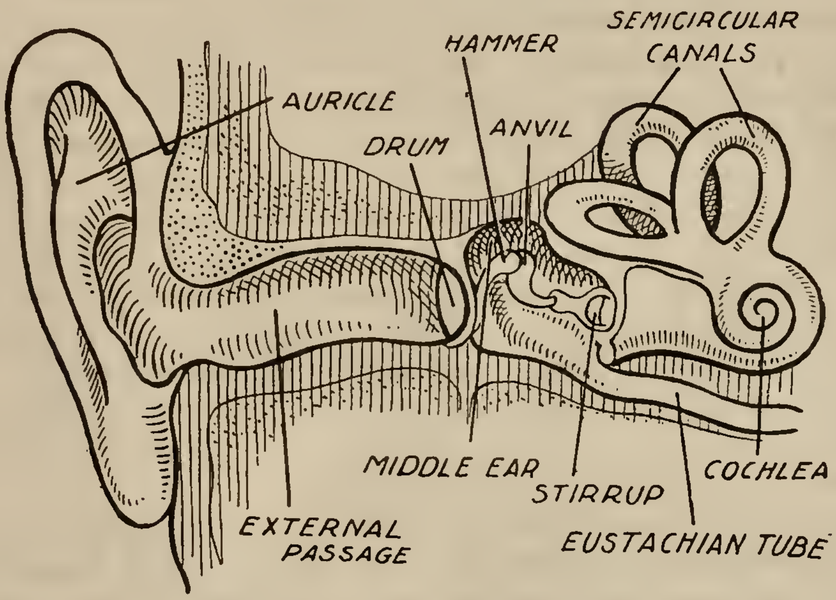


Fig. 48.—Section of the Ear.

The lowest portion of the external ear is called the lobe, or lobule, and is the part to which earrings are attached. The custom of wearing earrings is of very ancient origin, and, besides being a means of adornment, is popularly believed to be a valuable remedy for weakness and soreness of the eyes by acting as a counter-irritant. But there is no connection between the nerve supply of those parts, nor any satisfactory evidence of benefit being obtained from the wearing of earrings.

Drum. The tympanic membrane, or ear-drum (Fig. 48), stretches across the auditory passage and shuts it off from the cavity of the middle-ear; it is very thin, forms an angle of 45° with the lower wall of the passage, and its centre is depressed towards the middle ear. It is not unfrequently ruptured by blows on the ear, fits of sneezing or vomiting, or loud noises, and may be perforated by disease of the deeper parts for the escape of discharge.

Middle Ear. The middle ear is a small irregular cavity in the bone, lined by mucous membrane and occupying a position, as its name implies, between the external and internal ears, being separated from the external by the tympanic membrane, and from the internal by thin membranes which close two openings called the fenestra ovalis and fenestra rotunda—the oval and round windows. Extending across the cavity from the drum to the "oval window" is a chain formed of three minute bones, which are named, from their shapes, the malleus, or hammer, the incus, or anvil, and the stapes, or stirrup. The handle of the hammer is fixed to the tympanic membrane, the bar of the stirrup to that in the "oval window," and the incus in the centre is connected by movable joints with both the other bones, and thus completes the chain. Small muscles are attached to these bones, and can tighten and slacken the membranes.

The middle ear communicates with the outer air by the Eustachian tube, which, about an inch and a half long, runs inwards and forwards and opens into the throat behind the nose.

A very thin layer of bone separates the roof of the middle ear from the brain cavity, and inflammation may easily spread through it from the ear to the membranes of the brain. The facial nerve, which lies in a canal thinly covered with bone, may be involved in the same way, and thus we find explained the connection between ear trouble and paralysis of the face.

Internal Ear. The internal ear is the essential organ of hearing, the middle and external being only passages leading to it. It consists of most complicated nervous structures situated in many caves and passages hollowed out of the hard bone. The bony parts are called the osseous labyrinth, and they contain membranous structures very similar in their general shape, called the membranous labyrinth. Between the bony and membranous labyrinths is a fluid called the perilymph, while the membranous labyrinth is filled with a fluid called the endolymph.

The structures of the internal ear are divided into three chief parts—

the vestibule or central chamber, the cochlea or spiral chamber, and the semicircular canals or curved passages. A special nerve of hearing passes from the brain through a hole in the bone, and its terminal filaments are spread over all these parts, and it is so exposed that it is affected by all sounds transmitted to the complicated structures of the internal ear.

The *vestibule* is the central cavity of the internal ear, and its membranous structures are divided into two sacs, on which the nerves are spread. In these sacs is fluid in which are situated small crystalline bodies called otoliths. In the outer wall of the vestibule is the oval window (fenestra ovalis), closed by its membrane, to which the stirrup bone is attached; at its back are the openings of the curved passages (semicircular canals), and in front it communicates with the spiral chamber. The *semicircular canals* are three curved passages which lie in three different planes, each one at right angles to the other two. The *cochlea* is in appearance much like the shell of a snail (hence its name); it contains a spiral chamber, which forms two and a half turns round a central pillar, and is divided into two passages by a partition formed partly of bone and partly of membrane, the latter being called the basilar membrane. On this basilar membrane is a most interesting structure called the organ of Corti. It is very complicated in its formation, consisting of a large number of cells which are excessively sensitive to the vibrations of sound. Fine filaments of the nerve of hearing end in the cells of the organ of Corti.

The sense of hearing depends upon the vibrations of the air caused by sound being transmitted to the minute filaments of the auditory nerve spread out in the internal ear. Sounds are collected and transmitted by the external ear to the drum, which is set in vibration, and from this they are transmitted along the chain of bones—the hammer, the anvil, and the stirrup—to the membrane in the oval window. From this membrane the sounds pass to the fluid of the internal ear, and by means of it to the nerves in all parts of it, the effect being increased by the vibration of the solid otoliths. The organ of Corti acts somewhat as the strings of a piano, each little pair of rods answering to separate notes and tones.

The semicircular canals are of importance in the maintenance of the erect position, and it is with their help that we recognise the position of surrounding objects relatively to ourselves.

CHAPTER XXVI

DISORDERS OF THE EARS

Wax in the Ears—Insects and other Foreign Bodies—Boils—Injuries to the Ear-drum—Inflammation of the Middle Ear—Obstruction of the Eustachian Tube—Diseases of the Internal Ear—Menière's Disease—Earache—Running from the Ear—Singing in the Ear—Deafness.

WAX IN THE EARS

The wax which is constantly being formed by the small glands in the ear passage gradually works its way out, but under certain circumstances is liable to collect. This often occurs after a cold in the ear, by which the passage is partially closed and the shut-in wax becomes dry and hard. It then causes some deafness, with a feeling of numbness and discomfort. The wax may be removed by syringing, and it is sometimes necessary to soften it beforehand by dropping in a few drops of warm oil or glyceriné at bedtime and retaining it in the ear with a small plug of cotton-wool.

Much wax may collect in the ears without giving rise to any inconvenience or sign of its presence, for so long as the very smallest passage to the drum is left no interference with the hearing occurs; on the other hand, a very small portion of hard wax which presses against the membrane may cause much deafness by preventing its free vibration. Sometimes a troublesome dry cough is caused by its irritation of the nerves. When deafness occurs from this cause it usually does so suddenly, from some slight movement of the wax or from the entrance of a few drops of water, which causes the wax to swell.

To place drops in the ear it is necessary to use an ordinary "dropper" or a teaspoon. The latter should be warmed by dipping it in hot water, and the drops can be poured from it into the ear when the head is laid on one side.

To use an Ear Syringe.

Syringing the ears cannot be done satisfactorily for oneself. If done by a novice, the greatest care and gentleness must be exercised, for violent syringing in inexperienced hands has many a time caused a tear in the drum. The process should never cause any pain, and only three or four syringefuls should be used at a sitting. Certain people are affected with a feeling of faintness and giddiness when their ears are syringed, especially if the water is not warm enough. The syringe to be used is of the ordinary shape, but a special form (Fig. 49) can be obtained from any chemist or surgical instrument maker. It should be of good size, with a small nozzle, and it is much easier to use if it has three rings for the thumb and fingers, one on the piston and two on the barrel of the syringe. The syringe has to be filled with warm water from a separate vessel, and all air must be excluded. A towel is placed over the shoulders of the patient, and a small basin or jug is held by him firmly pressed against his head below the ear; some persons, by the way, prefer an ear channel (Fig. 50), which fits over the ear and prevents the clothes from being wetted. The ear is drawn upwards and backwards with the left hand, so as to make the passage almost straight, whilst the syringe is held in the right. The nozzle must not be introduced far into the ear, and the stream of water must be directed upwards against the roof of the passage. After the wax is removed a piece of cotton-wool should be worn in the ear for a few hours, as a safeguard against catching cold.

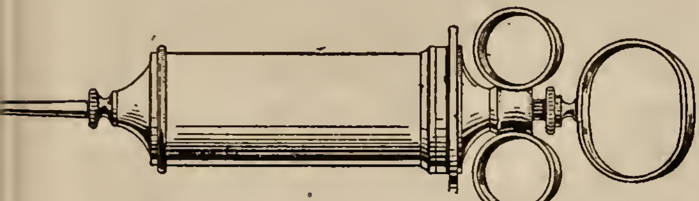


Fig. 49.—EAR SYRINGE.

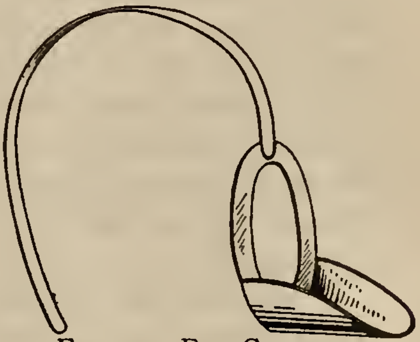


FIG. 50.—EAR CHANNEL.

INSECTS AND OTHER FOREIGN BODIES IN THE EAR

Occasionally insects crawl into the ear and cause a good deal of alarm, but they do little injury, for they can, of course, only find their way as far as the drum. They may be removed by syringing the ear carefully with warm water. If a syringe is not at hand, the ear should be filled with warm olive-oil, kept from running out with a plug of cotton-wool. This soon drowns the intruder, which floats to the surface, or can afterwards be easily removed with the syringe.

Many small objects may be introduced into the ears accidentally or, in children, intentionally. Stones, beads, shells, cherry-stones, berries, peas, beans, and seeds of various sorts are amongst the objects most commonly introduced. They may remain in the ear for long periods, and cause no sort of discomfort, so that there is no need for alarm and urgent interference. Many instances of severe injury, acute inflammation, and even some deaths have been reported through the mischievous meddling of anxious friends in a hurry to extract such things; the object is exceedingly likely to be forced farther in through the narrowest part of the canal, so that the difficulty of extracting it is much increased and the drum is often torn. It is necessary, first of all, to be quite certain that something is in the ear, for many a time injuries are caused by attempts to get something out when the ear is quite empty.

Treatment.

The treatment depends upon the kind of object introduced. Stones, beads, etc., can be easily removed by syringing with warm water, carefully following the rules we have given; but peas, seeds, and such things will swell when soaked in water, and unless they are at once dislodged will cause great pain. It is wiser in such cases to wait for the doctor, who will remove the objects either by syringing or with small forceps used with the assistance of reflected light. Many of these bodies can be got rid of by turning the head on one side, with the affected ear downwards, and giving it a sharp shake or tap, when the thing will fall out.

BOILS IN THE EAR

Boils and abscesses in the ear passage cause the most acute pain, and are very common troubles. They particularly attack those who are run down and out of health, but are occasionally met with in perfectly healthy persons who have had to give up exercise and take to a sedentary life. In such circumstances the diet must be limited, as for a gouty person, and the bowels kept acting freely. Boils are very liable to recurrence, and one may follow another in quick succession.

The earliest symptom is intense itching, but as the swelling increases very severe pain is set up.

Inflammation of this part may also be caused by the irritation of retained wax or by exposure to cold.

Treatment.

To stop the itching zinc ointment will be found useful, and to soothe the pain and subdue the inflammation hot fomentations and compresses. Drops of warm oil with laudanum are soothing, but nothing gives greater relief than a cut with a fine knife, which sets free the discharge. This operation, slight as it is, should, of course· only be done by a doctor.

INJURIES TO THE EAR-DRUM

The membrane of the drum may be torn in a variety of ways—by "picking" the ear with sharp instruments or in clumsy attempts to remove a foreign body with instruments, by violent syringing, by the forcible compression of air from within that occurs in vomiting or sneezing, or from without by a box on the ears or the explosion of a gun, or by the force of a blow or fall on the head. When the rupture occurs a sudden sharp sickening pain is felt, often accompanied with faintness and followed by the discharge of blood from the ear. The patient finds also that air can be forced out through the ear when he blows his nose or sneezes.

After such an accident the tear usually heals rapidly, even in a few days, if things are left alone and no form of treatment is employed. It is most important to understand that no drops or water should be used, or syringing done, for either measure is exceedingly likely to set up a mattery discharge. The hearing is little affected in those cases where the drum has been torn by instruments, but when the injury is due to blows or explosions much deafness often follows from implication of the nervous structures.

Loss of hearing is also caused by the formation of a mattery discharge, and the treatment then necessary is similar to that of inflammation of the middle ear, a condition in which the drum is frequently perforated and destroyed by the escape of "matter" through it.

INFLAMMATION OF THE MIDDLE EAR

The tympanum, or middle ear, often becomes inflamed in scarlet fever and measles, but as the symptoms of these diseases are severe they are likely to occupy the attention, and the ear trouble is unnoticed until convalescence, when irreparable mischief may have been set up in this delicate organ. The inflammation may also be caused by exposure to cold, and may be due to the spread of catarrh along the Eustachian tube from a sore throat.

Symptoms. The symptoms are quite easy to recognise. There is pain, which is excessive and throbbing, is felt deeply in the ear and over the head, and is much increased by swallowing or by blowing the nose. There is also some deafness, with noises in the ear. If treatment is not at once employed, matter is very likely to form and break through the drum, causing a free discharge from the ear. The discharge of the matter instantly gives relief to the pain.

Treatment. The proper treatment is at once to apply hot fomentations, bread poultices, or a camomile flower compress all over the affected ear. If discharge from the ear occurs, the greatest care is necessary to keep it sweet, and the passage should be gently syringed out with boracic lotion (a teaspoonful of boracic acid to a tumblerful of warm water) every two or three hours. A small piece of cotton-wool should be worn in the ear to soak up the discharge, and should be changed frequently. The discharge should occasionally be blown out of the ear by an interrupted attempt to blow the nose. Fortunately in these cases the drum has a great tendency to heal, and in a week to ten days most cases are well, but not all, and it is the chronic cases in which so much danger arises of inflammation of the membranes of the brain and facial paralysis. Such cases require the skill of a specialist.

OBSTRUCTION OF THE EUSTACHIAN TUBE

The lining membrane of the tympanum, or middle ear, is continuous with that of the Eustachian tube and the throat, and very often catarrh of the throat spreads up the tube to the ear, and the swelling in the tube thus produced blocks up the passage, and is followed by a definite train of symptoms. This trouble is most often met with in children and young people who suffer from chronic sore throat, enlarged tonsils, or adenoids, but may arise in connection with any cold in the throat.

When the Eustachian tube becomes blocked, no air can enter the middle ear when swallowing, as it does in a state of health. The air already there becomes gradually absorbed, and the air pressure on the inside of the drum grows less than that outside. As a result the drum is pressed inwards, becomes tight, and cannot vibrate to sounds. The symptoms produced are deafness, with a sensation of weight or numbness in the ear. Preventive treatment consists in curing the **Treatment.** affection of the throat according to the directions given for adenoids in children and simple sore throat. When the obstruction has arisen it can be relieved by using either of the following lotions:—

PRESCRIPTION 133

Bicarbonate of soda }
Boric acid } of each 1 teaspoonful.
Sugar }
Water to ½ pint.

To be mixed with an equal quantity of warm water.

PRESCRIPTION 134

Glyco-thymoline . . . . . . 6 ounces.
One tablespoonful with 5 of warm water.

Either of these to be used as a gargle every 3 or 4 hours, and as a nasal douche night and morning.

Instant relief, which is usually only temporary, may be obtained by forcing air along the Eustachian tube into the tympanum. This can be done by a very simple process. The mouth and nose being closed (the latter by pinching it between finger and thumb), the cheeks must be blown out whilst a mouthful of water is swallowed. A sense of pressure is thus produced in both ears, due to the compressed air passing up the tube.

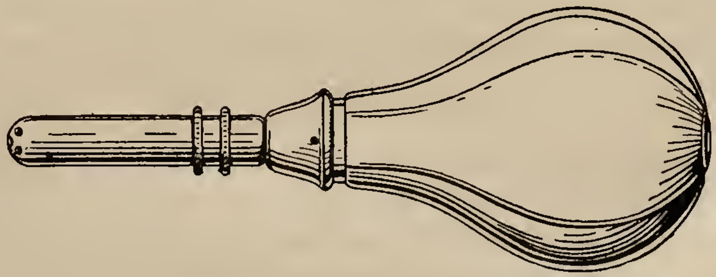


Fig. 51.—Politzer's Bag.

If the obstruction of the tube is too great to be overcome in this way, an appliance called Politzer's bag may be used. The patient, being seated, takes some water into his mouth, to be swallowed at a given signal. The operator takes the indiarubber bag (Fig. 51) in his right hand, inserts the nozzle into one nostril, and closes the nostrils by pressure of the thumb and finger of the left hand; he then tells the patient to swallow, and during the act squeezes the bag and forces the air out of it. By this means he raises the air pressure in the nose at the time when the Eustachian tube is open, and the nose is shut off from the throat by the curtain of the palate.

This treatment should not be carried out too forcibly, or the drum may be torn, nor too often, or it may be stretched: once a day for three or four days will be as frequent as is advisable.

DISEASE OF THE INTERNAL EAR

The nervous structures of the internal ear are sometimes diseased. They may be affected by an injury, a box on the ear, a blow on the head, or the concussion of an explosion. They may be involved in general diseases, such as syphilis, acute fevers, and mumps, or may be secondarily involved through the nervous system by violent emotional disturbance, nerve shock, or mental strain. In such cases the power of hearing is lost or greatly diminished, either suddenly or gradually; and that it is the nervous structures that are affected is shown by the inability to hear a watch or tuning fork even when it is placed against the bones of the head. Usually also noises in the ears are present, and form one of the most distressing accompaniments of disease of the nervous structures of the ear. Most of the cases of nervous deafness are irremediable, but those caused by emotional conditions sometimes recover suddenly without treatment. The drug most likely to be of benefit is strychnia; 3 drops of the solution may be taken three times a day.

MÉNIÈRE'S DISEASE

Auditory vertigo, or giddiness caused by disease of the ear, is a peculiar complaint which was described by Ménière, a French physician, in 1861. It is supposed to be due to some affection of the semicircular canals whose function it is to maintain the erect position and inform the brain of the relative positions of the body and surrounding objects.

Symptoms.

The attacks usually come on suddenly with buzzing or other noises in the ears and intense giddiness. The latter may give the patient the sensation that he is turning round and reeling about, or that all objects about him are rapidly moving round him. In consequence of this sudden giddiness he may fall down, or only save himself from doing so by grasping hold of the nearest object. Occasionally there may be a short space of unconsciousness. The giddiness passes off rapidly, and leaves the patient pale and with his face covered with sweat. He feels intense nausea, which often ends in an attack of vomiting.

The ear—for only one is usually affected—may be deaf. The noises are very trying, and may be a roaring, throbbing, or buzzing. The attacks are very irregular in their occurrence, sometimes following one another several times a day, at others only once a week, or once a month. Men are more liable to the complaint than women, and it seldom affects anyone under the age of forty. Certain cases of Ménière's disease get well; others grow worse, and the attacks more frequent, but there is no danger to life apart from the liability to serious accident during one of the paroxysms. Occasionally the ear becomes gradually deafer until the loss of hearing is absolute, and in such cases the attacks of giddiness pass off and disappear with the sense of hearing.

Treatment.

Salicylate of soda 10 grains, or sulphate of quinine 2 or 3 grains, in tablets, three times a day, sometimes give relief; in cases which may be due to syphilis, iodide of potash 3 to 5 grains, three times a day, should be tried; but of all drugs, that which is found most beneficial is bromide of potash. It should be taken at first in 10-grain doses three times a day, gradually increased to 20 grains

EARACHE

Pain in the ear is a very common trouble, especially in children, and causes great suffering, for the pain is often very intense and difficult to bear.

It is not always due to disease of the ear itself, for neuralgia is liable to affect this part, when the most frequent cause is some affection of the teeth. Pain in the ear is sometimes caused by teeth which are neither decayed nor tender, and a dentist should be consulted if earache occurs without any apparent cause. But in many cases a decayed tooth is found which is acutely tender through exposure of a nerve in the pulp. This should receive attention; the best medicine would be 15 drops of tincture of gelsemium for an adult (less for children), in water, every four hours. The pain caused by the cutting of a wisdom tooth is very liable to be mistaken for earache.

But to turn to earache caused by affections of the ear itself, we may find something wrong in the external ear passage—a foreign body in it, or one of the small boils or abscesses we have already described, or an inflammation of the mucous membrane brought on by cold. Then, again, the middle ear may be inflamed, and, as we have shown, this is most likely to be connected with sore throat, from which catarrh has spread along the Eustachian tube.

Earache may be of serious import, and a doctor should be consulted if it does not rapidly subside under home remedies, and even if it subsides but is followed by a discharge.

A hot bread poultice or fomentation sprinkled with laudanum should be applied all over the ear and renewed every hour or two.

Treatment.

Even greater relief is obtained by a camomile flower poultice, prepared by making a small muslin bag and filling it with camomile flowers, which can be obtained from any chemist. This should be dipped in boiling water, wrung out dry, laid over the ear, and covered up with oil-silk. Warm sedative drops should be placed in the ear passage; equal parts of olive oil and laudanum may be warmed before the fire in a teaspoon and poured into it. Equal parts of glycerine and belladonna may be smeared all round it before the fomentation is applied. Many cases of earache may be cut short by a prick with a surgeon's knife, by which a little boil or abscess is opened or matter let out through the drum.

"RUNNING FROM THE EAR"

Discharge from the ear may be due to an inflammation of the middle ear which has formed an abscess and discharged through the drum. This is not a case for domestic treatment, for we have explained that the inflammation may spread through the bone to the brain. It may also cause disease of the bone, which will keep up the discharge indefinitely. Discharge may be set up, too, by external causes—the breaking of an abscess or boil in the outer passage, a cold in the same part, or the presence of eczema.

If the " running " is free, great care should be taken to give it vent, and much danger is run by blocking it in the passage with plugs of cotton-wool.

Treatment.

If these are used at all they must be changed very frequently—as soon as they get wetted. In long-continued discharge it is very important to keep it clean and free from smell, and the best way to do this is to wash out the discharge night and morning with an antiseptic lotion, the safest for domestic use being a teaspoonful of boric acid in a pint of warm water, or warm water made a faint purple with Condy's fluid. The syringing should be done very gently. Some discharges which come from the external passage can be cured by pouring into it a few drops of warm glycerine of tannic acid, and preventing it from running out by means of a piece of cotton-wool inserted for a few hours.

It is a popular belief that there is danger in stopping a chronic discharge from the ears, but this is not true if it is done properly. To block the ear with cotton-wool or other material is very dangerous, but to heal the discharging surface with antiseptic and other application is not only safe but necessary, for constant discharge from the ear generally means disease in a most dangerous situation.

SINGING IN THE EAR

Singing and various other noises in the ears are common, and sometimes are so severe as to cause great distress. They are of many kinds, and are likened to the hissing of a kettle, humming, buzzing, ringing of bells, or even the sound of voices. They may be caused by such a simple thing as pressure on the drum by accumulated wax, or by the blocking of the Eustachian tube by a cold, whereby the free entrance of air to the middle ear is prevented and the drum becomes tense and unable to vibrate. Noises in the ears are, however, most common and annoying in cases of nerve deafness, in which the important structures of the internal ear are affected by disease. Strange sounds are sometimes produced by drugs, especially salicylate of soda and quinine, which act more rapidly and with smaller doses on those who have some ear trouble. The symptom disappears when the drugs are discontinued.

Causes.

To cure the simple forms of this affection is easy. Collections of wax can be removed by syringing, blocking of the Eustachian tubes by blowing air along them, as elsewhere described (p. 73). But the nervous causes are very difficult to treat, and, indeed, are in many cases quite incurable. Some relief may, however, be obtained from 10 to 15 grains of bromide of potash in tablets, or 3 drops of solution of strychnia in water, three times a day.

Treatment.

DEAFNESS

Loss of hearing is a symptom of a large number of disorders of the ear, but may occur also in conditions quite unconnected with this organ.

It is a trouble that often runs in families, many members of different generations being affected. In such cases it is usually caused by chronic inflammatory thickening of the structures composing the ear. Deafness may be present at birth, when it involves both ears, and may be due to some deformity of the external structures, but it is more often caused by an imperfect development of the nervous mechanism. Of this we shall speak in the section on Children's Diseases. Deafness may also be due to blocking of the ear passage by inflammatory swelling, wax, foreign bodies, to affections of its lining membrane, to tumours, or masses of fungus; it then chiefly affects one ear, and is more common in adults than children.

Treatment.

Treatment consists in the removal of the cause, the most useful method being syringing, with the precautions we have described (p. 69). Occasionally, in old age, the gristle of the ear collapses, and blocks up the outer opening; the remedy for this condition is to wear a small silver tube, which keeps the walls of the canal apart. If loss of hearing is consequent upon diseases of the middle ear—especially inflammation which thickens, displaces, or destroys the drum, obstructs the cavity, or fixes the ear bones (ossicles) together and impedes their movements—the advice of a specialist must be sought. If deafness is due to obstruction of the Eustachian tubes (p. 72), relief can be attained, at least temporarily, by forcing air into the ear from the throat. This is called throat deafness, and generally affects both ears. When deafness occurs as a result of disease of the nervous structures of the inner ear, the loss of hearing may be both absolute and irremediable. Nervous deafness, as it is termed, sometimes follows severe attacks of the infectious fevers or an attack of mumps, and sometimes violent emotional disturbances, long-continued anxiety and mental strain.

Attacks of megrim (sick headache) and Ménière's disease often produce nervous deafness, which in the latter disease grows worse, and may become complete. Disease of certain portions of the brain also, such as tumour, are accompanied by this symptom. Certain drugs cause deafness in some persons, especially quinine and salicine preparations. Injuries to the head may affect the hearing, either from shock to the delicate structures or from tearing of the parts. Gun-deafness is probably nervous in origin.

One peculiarity in connection with deafness which it is difficult to explain is that some of those whose hearing is imperfect can hear better in the midst of noise—when in a moving train, standing near a waterfall, or surrounded with machinery in motion. Another peculiarity is that, in the deafness which gradually comes on in old persons, high notes are those which they are first unable to hear. They may catch ordinary conversation quite easily, but find it necessary to put a watch close to their ears before they can tell if it is going.

To judge Degrees of Deafness.

The degree in which hearing is defective may be judged from the distance from the ear at which a loud-ticking watch or a tuning fork must be held in order to be heard, compared with the distance from the other ear or from the ear of a healthy person. If the watch or tuning fork be placed against the skull it is sometimes heard more plainly in the deaf ear, and the cause of deafness is then known to be some form of obstruction either in the outer passage or in the Eustachian tube. But if such a sound is heard less plainly, or not at all, in the deaf ear, it is the nervous structures of the inner ear that are affected. In a healthy person the sound would be heard equally well in both ears.

The best way of examining the ear without the aid of the special appliances of the surgeon is to draw the ear upwards and backwards, and use as bright daylight as is available.

Ear-trumpets are chiefly useful in that they collect the waves of sound and transmit them to the drum, and it is necessary for the deaf to choose for themselves the instrument which gives them most assistance. Artificial drums can be obtained which can be fixed in the ear to replace a destroyed membrane. These sometimes much improve the hearing, and with a little practice can be placed in position by the patient himself.

A small megaphone has been found of great help in speaking to deaf persons.

CHAPTER XXVII

INFLAMMATION AND FEVER

Inflammation: Causes—Symptoms—Results—Exudation—The Glands in Inflammation—Treatment. Fever: A Beneficial Process—Temperature—Symptoms—Different Kinds of Fever—Onset and Course—Treatment—Stimulants—Drugs—Hyperpyrexia—Diagnosis.

INFLAMMATION

THIS is a subject of the greatest importance, for inflammation is a condition which we constantly meet with in all forms of disease. It is a process which occurs in all living structures as the result of any kind of injury.

Local Symptoms.

It starts by being a purely local condition, characterised by the four symptoms of *redness*, *swelling*, *heat*, and *pain*, but after a time is liable to develop general symptoms affecting the whole body, and collectively spoken of as " fever."

Predisposing Causes.

Exciting Causes.

All those conditions which lower the vitality of the whole body or any part of it, or interfere in any way with its healthy nutrition, must be considered as predisposing causes of inflammation, for they lessen its power of self-protection and render it vulnerable to the attack of any of the exciting causes. One of the best examples of a predisposing cause is that of exposure to cold, which may act either locally or generally. The exciting causes of inflammation are too numerous to mention, for they include all forms of injury and all sources of irritation. Amongst them are mechanical violence, chemical irritants, extreme degrees of heat and cold, and, more important than all, disease germs. The part played by micro-organisms in producing inflammation has only been recognised of recent years, but it has so influenced the minds of some scientists that they have expressed the opinion that no inflammation can occur without the presence of germs. This has, however, not been proved, though it is considered by most authorities to be a true statement, with some few yet not unimportant exceptions. Germs are known to be present in the great majority of cases of severe inflammation.

Although inflammation must be looked upon as a disease, with definite causes and symptoms, it is most important to understand that, unlike diseased conditions in general, it has often a distinctly benign purpose, and is Nature's method of repairing an injury, healing a wound, and bringing about a cure. No wound or injury can be healed without the occurrence of some inflammation: indeed, no bleeding can be permanently checked without it. When an artery is cut the loss of blood from it may be temporarily checked by the formation of a blood clot, or by the application of a ligature by a surgeon, but it is only by Nature's reparative processes, produced by inflammation, that the recurrence of bleeding is prevented and the opening permanently sealed. The edges of a wound in the same way are fixed together, and the loss of structure caused by an injury is made good by the processes of inflammation.

The best way to explain what takes place in inflammation is to describe the cause of its four characteristic symptoms.

Four Characteristic Symptoms.

The *redness* is due to a great increase of the amount of blood in the vessels of the inflamed part. The vessels dilate and become full of blood, and the circulation is carried on more rapidly. But this is soon followed by a slowing of the flow of blood; the white blood cells appear to grow "sticky," and cling to the wall of the blood-vessel, the watery part of the blood soaks out of the vessel into the surrounding tissues. This is succeeded by a most interesting phenomenon, which is called diapedesis: the white blood-cells clinging to the wall push out processes into and then through it, and finally follow the processes bodily and collect in large numbers outside the vessels. This oozing out of fluid and cells causes the next symptom, namely, *swelling*, and forms what is called the inflammatory "exudation." The symptom of *heat* is due to the increased amount of blood in the part, and the *pain* to the pressure on the small nerves by the exudation.

Results.

The course taken by inflammation varies. The exudation may gradually be absorbed, the blood supply become normal in amount, and the part affected resume its natural condition. This is called the *resolution* of inflammation, and is the course taken when the irritation has been slight or the wounds small and free from microbes.

If the inflammation has been more severe, or microbes have entered the wound, a far larger number of white cells are called to the scene of action, and they collect in large quantity and form matter. The condition is then called *suppuration*, and the collection of matter an "abscess." The matter has to find its way to the surface and discharge, or is let out with the prick of a lancet.

In some cases the skin is the seat of inflammation, and the surface is destroyed; discharge is then formed which runs away, and the sore surface is called an "ulcer," the inflammation being said to terminate by *ulceration*. New skin is gradually formed, the ulcer heals, forming a scar or cicatrix.

In severe injuries there is much destruction, the inflammation is excessive, and large portions of tissue die. This is called *gangrene*, or *mortification*.

More about Exudation.

There are a few more points of interest regarding the exudation which is formed around the vessels, and which consists of blood corpuscles, white and red, blood fluid or serum, and fibrin. It is called plastic lymph, because it forms new structures. It may break down into matter, or form fibrous tissue or bone, according to the part injured. If the inflammation is in the pleura, pericardium, or peritoneum, the lymph sticks the opposing surfaces together and forms bands or adhesions; if it forms on the valves of the heart it produces little outgrowths, called "vegetations."

Again, in inflammation of the serous membranes, of which the pleura is an example, the exudation is both solid and fluid, but the latter may be in great excess and cause a large collection, called an effusion. It is an effusion of fluid which causes the great swelling of joints when inflammation is set up in them by sprain or wound. This also occurs in inflammation of the mucous membranes, as in a cold in the head, but the fluid effusion then comes away in the form of discharge, and is called a catarrh.

The activity of inflammation depends a good deal upon the extent of the irritation or injury by which it is set up, but it also depends upon the constitutional state of the person affected. In strong, full-blooded persons it is active and severe, and is called *sthenic*, but in the weak and debilitated it is less severe and more passive, and is termed *asthenic*. It is important to recognise the difference, for the treatment required varies according to the form the inflammation takes.

Again, according to its mode of onset and the course it takes, inflammation is spoken of as acute, subacute, or chronic, but not infrequently the chronic inflammation is the result of an acute attack imperfectly cured.

Ulceration is the destruction of tissues in very small particles. It may occur in any part—bone, gristle, skin, or mucous membrane. In the last two it produces a sore place or ulcer, from which the particles mixed with matter come away as discharge. Destruction in large pieces is called gangrene. The discharge developed during suppuration is called pus, or matter, and is a thick, creamy, light yellow, faintly smelling fluid which, under the microscope, is seen to be formed of a thin, clear, watery fluid with enormous numbers of round cells floating in it, the pus corpuscles.

In *chronic* inflammation the exudation neither undergoes resolution and disappears nor breaks down into matter, but becomes gradually changed into fibrous tissue and forms a firm, hard swelling.

The Glands in Inflammation.

In some cases of local inflammation, especially when it is set up by germs, as in erysipelas, the disease spreads very rapidly over the surface. It may also involve the lymphatic vessels and spread upwards along them to the lymphatic glands. These little organs act like filters, and for a time at least remove the poisonous substances and prevent their entering the blood. The glands then become enlarged and inflamed, and may finally break down and form abscesses. They are situated at definite spots, and the lymphatic vessels of different parts of the body pass to distinct sets. Those of the calf run up to some glands in the hollow behind the knee, whilst all others of the lower limb pass to glands in the groin. The glands of the arm-pit receive all the lymph from the arm, except for a few vessels which pass to a small gland above the inner side of the elbow.

Along both sides of the neck, extending from the lower jaw to the collar-bone, are situated important chains of glands which are very liable to disease. They receive the lymph from the head, neck, tongue, and throat. When any gland becomes enlarged and tender, it is of importance to find the source of irritation, to remove it at once, and also to subdue as quickly as possible the inflammation in the gland.

Treatment.

When inflammation arises in any part of the body our first endeavour is to discover its cause, and at once remove it. This is often easy in an external part, sometimes also in an internal part, but the definite exciting cause of many internal inflammations is beyond recognition or, if recognised, is incapable of removal mechanically. It is an important principle, generally received as true, that inflammation tends spontaneously to recover if its exciting cause is removed. Of mechanical causes of inflammation good examples are a piece of grit in the eye, a stone in the bladder, or indigestible food in the stomach. Remove these, and their effects rapidly subside.

But the most common exciting cause is, as we have seen, micro-organisms, and these also have to be removed in order to carry out the first principle of treatment. This can be done by the antiseptic dressing of wounds as recommended by Lister. By this the germs can be excluded from a wound or removed from it if they have already found entrance. Since this method has been used, the inflammatory reaction in wounds has been marvellously diminished.

Rest.

The second cardinal principle that should direct our efforts is that an inflamed part should be rested. Pain may be looked upon as Nature's call for rest. This may be carried out in many ways, according to the part affected. An inflamed eye should be covered up from all light, an arm supported in a sling, a knee fixed on a splint, a stomach relieved from the work of digestion. Further, if the inflammation is considerable or involves an important organ—as the brain, lung, or heart—we can escape from all external stimulation by resting in bed in a quiet, darkened room. This is of essential importance when the body generally is affected or the constitutional symptoms show themselves in the form of fever. The constitutional treatment is therefore that of fever, and here we shall only consider the local measures.

Blood-letting.

An inflamed part should be raised in order to favour the flow of blood from it. Local blood-letting also relieves the congested state of the blood-vessels. It may be carried out in various ways by what is called cupping, by leeches, and by scarification or small incisions.

Application of Cold and Heat.

The application of cold is frequently resorted to in order to subdue inflammation. It acts by constricting the blood-vessels, and thus driving the blood from the part. A bandage wetted in cold water, a piece of wet lint, a waterproof bag filled with ice, or an evaporating lotion (lead or spirit lotions), are some of the means of carrying out this treatment. In other cases moist heat is more suitable. It may be applied in the form of poultices, fomentations, and compresses, to any of which such sedatives as laudanum, tincture of belladonna, or liniment of aconite may be added. It is not always easy to decide whether hot or cold applications are the more suitable. First we may consult the patient's feeling, using whichever gives the more relief and is the more grateful. The effect depends also upon the nature of the part. When it is loose, and swelling can take place freely, cold is the better, but when it is firm and tight and the swelling causes great pain, more relief is obtained from heat. Heat is better also when " matter " is forming and there is great heat and throbbing pain in the part; cold, on the other hand, checks swelling and often relieves the symptoms of a sprained joint.

In the more chronic forms of inflammation, when there is little heat and pain but much thickening and stiffness of the part, stimulating treatment is advisable—very hot applications, strong liniments, and counter-irritation with blisters or iodine paint. A method of applying heat which is found very useful in these cases is to douche the part with very hot water, which may be played on to it from a tap or poured from a height out of a jug. Great heat can also be applied by special apparatus, as in the Tallerman treatment, in which the limb is placed in a chamber or cylinder and subjected to high degrees of dry heat. Friction forms part of the massage treatment, which can be strongly recommended for removing the final results of inflammation. It increases the circulation through the part, improves its nutrition, lessens thickening and stiffness, and soothes pain. Pressure applied continuously, by means of plasters or elastic bandages, is beneficial. Treatment by hydropathy is sometimes found useful in chronic inflammatory conditions, such methods as douches, packs and baths being employed, but all these are best carried out in special institutions and at mineral-water spas. In these conditions also the internal use of mercury and iodide of potash is recommended.

FEVER

The various phenomena which constitute fever are the constitutional symptoms of inflammation, and their severity and importance depend greatly upon the extent of the inflammation, the part or organ affected, and the cause. We shall here consider the subject of fever generally, however produced.

The cause of fever has always been a great mystery, and even now, although experiment and observation have greatly increased our knowledge of it, we can hardly feel that we have discovered a certain explanation. In ancient times fever was looked upon as beneficial and as Nature's means of purifying the body by heat. Nearer our own times it was viewed in an opposite light, as a dangerous thing, the symptoms of which required immediate removal. At the present day the old view is being revived, and many now consider it to be the means by which Nature attempts to destroy disease.

Fever a Beneficial Process.

It is believed that the chief, if not the only, cause of fever is the introduction into the body of noxious germs, and that the poisons they produce act on the nervous centres, which respond to the need and raise the temperature of the body to the heat necessary to destroy the intruders. There is abundant proof that high temperatures are destructive to microbes, and that few conditions lay the body more open to their attack than cold.

Temperature.

It is said that if the body could be raised to about 112°, even tubercle bacilli could not live in it. Unfortunately this would mean death to the patient also. A very high temperature, 105° or 106°, is in itself dangerous to life, and shows that a very large dose of poison has found an entrance; but moderately high temperatures are beneficial, and cases of which such temperatures are a feature are more likely to recover than those with less fever. Fever temperatures have been thus classified by Wunderlich :—

Slight fever—100·4° to 101·1°.
Moderate fever—101·3° to 102·2° in morning, 103·1° in evening.
Considerable fever—103·1° in morning, 104° in evening.
High fever—103·1° in morning, 104·7° in evening.
Hyperpyrexia (very high fever)—107·6°.

The prolonged exposure of the body to great heat sometimes produces a rise of temperature, as in "heat-stroke," and appears to be an exception to the foregoing suggestion that germs are the only cause. But the conditions in "heat-stroke" are so peculiar that many authorities consider that it should not be called fever at all.

With the rise of temperature other symptoms of fever present themselves, showing the involvement of all organs of the body.

Symptoms of Fever.

The skin is hot, dry, and burning; the face is flushed and the expression anxious and strained; the eyes are bright, red, and watering; the pulse is rapid, full, and bounding; the breathing quickened and laboured, the breath hot and offensive; the digestion fails, the tongue is dry and furred, the appetite bad, constipation severe, thirst excessive; all the secretions are diminished in quantity; the urine is scanty, high coloured, and loaded with a sediment of urates; the nervous system suffers, there is headache, with pains all over the body, restlessness, and often delirium; the body wastes, and weakness becomes extreme.

Different Kinds of Fever.

These are the symptoms of all fever, whatever may be its cause or the course it may take, but there are many important particulars by which the various feverish diseases are distinguished from one another. There may be, for instance, "continuous" fever, in which the temperature remains high for some time without any marked variations, as in typhoid and typhus fevers; or the fever may rise and fall without ever reaching the normal, when it is called "remittent"; or it may fall to normal for a time and again rise high, and it is then spoken of as "intermittent."

Again, feverish diseases are divided into separate classes, according to their cause or special symptoms. There are the "specific" fevers, each of which is produced by its own special poison, and never passes into any other fever or loses its identity, such as scarlet and typhoid fevers; and the "non-specific" fevers, which may be caused by many different conditions—but this group is rapidly growing smaller with the increase of knowledge. Both pneumonia and rheumatic fever, for example, were at one time considered non-specific, but are now known to be caused by a special germ. Then there are the "infectious" fevers, which are transmitted from one person to another by poison particles; and the "eruptive" fevers, characterised by their peculiar rashes.

Onset and Course.

The onset of fever may be sudden or gradual, the former in pneumonia, the latter in typhoid fever; and when it begins suddenly it is often accompanied by the peculiar symptom called a "rigor" or shivering fit, in which the patient shakes all over, feels miserably cold, and although his internal temperature is rising his skin is bloodless and chilly. The cold stage gradually passes into that of warmth; agreeable to the patient at first, it soon becomes uncomfortable, and perhaps intolerable, from the various symptoms of fever, and this continues until the stage of *defervescence* is reached, when the temperature falls and the other symptoms are ameliorated.

The fever may disappear suddenly by what is called a "crisis," which is often accompanied by a free sweat or profuse diarrhœa; in these circumstances they are called "critical" discharges. Or it may disappear by "lysis," falling a degree or so daily, and reaching the normal only in the course of a few days.

We do not here propose to describe the treatment of fever as it occurs with each distinct disease, but only the general management of feverish cases. **Treatment.** A feverish patient should always go to bed, not only because he is sure to feel weak and ill, but also because fever is most exhausting, and moving about would be sure to increase its effect. The injurious results of cold are also best prevented by the warmth of bed. Nourishment must be taken in large quantity, and yet in a very simple and easily digested form. In fever there is an excessive destruction of material, as is shown by the marked loss of flesh and the large amount of waste material which passes away through the kidneys, but there is great difficulty in taking food owing to the disturbance of the digestion and the loss of appetite. Solid food, especially solid animal food, **Diet.** is quite unsuitable, and the diet must consist of nutritious fluids, which should be given frequently and in small quantities—" little and often." The exhausting starvation diet for fever of old days has been replaced by a sustaining and supporting line of treatment, and we now feed (and not starve) a fever, but feed it intelligently. By this plan we limit the wasting of the body, sustain the strength, and render the convalescence from illness as short and speedy as possible. To encourage the patient to take food in sufficient quantity it must be nicely and properly prepared, and made tempting to his appetite and agreeable to his fancies. For this purpose it is most important that all nurses and those who are in charge of sick persons should be well informed regarding the modes of preparation of foods suitable for invalids.

Beef-tea, mutton broth, chicken or veal broth, arrowroot, gruel, eggs, milk and jellies are the most common articles for the diet of fever patients, and recipes for the preparation of most of these will be found elsewhere. As there is a large amount of waste material to be carried out of the body, plenty of fluid should be allowed—plain water in moderation, barley water, toast water, linseed tea, cold weak tea, Imperial drink, home-made lemonade and orangeade. These drinks are very acceptable to the patient, but they must not be given in large draughts, or they will produce indigestion and diarrhœa. Ice is very pleasant to a thirsty feverish patient, and may be added to the drink or given in small pieces to be slowly sucked. Milk is one of the most important foods in fever cases, and yet it sometimes disagrees, forming lumps of curd which irritate the stomach and cause vomiting and indigestion. To avoid this it should never be given alone in high fever, but diluted with barley water, soda water, or plain water, about one part to two of milk. Lime water, two tablespoonfuls to a tumblerful of milk, makes the milk more digestible, and the same result is obtained by peptonising it. Junket is another useful milk food which may be used to give variety.

In most cases we shall be able to give some of the starchy foods. Oatmeal gruel and arrowroot form staple articles of invalid fare, and should be made with milk, if that can be digested. Malted milk is easily borne by the stomach, and so is well-made Benger's food. They are both rather sweet, and are objected to by some patients for that reason. If so, the sweetness may to some extent be corrected by the addition of a little salt. Benger's food also is not easy to make, and requires care both to make it smooth and thin by proper mixing and to avoid its becoming bitter through over digestion. Vermicelli may be added to beef tea, rice or bits of toast to mutton broth. Eggs in custard or beaten up with milk or wine, and blanc-mange made of isinglass or ground rice, are also suitable.

Of the various meat preparations beef tea is probably the most valuable. It acts chiefly as a stimulant, but if the thick sediment, which is the muscular fibre itself, is stirred into it it is also nutritious. It may be partially digested or peptonised. A great number of meat extracts can be obtained, and are useful in fever cases, such as Bovril, Brand's meat extracts and jellies, Valentine's meat juice, liquid peptonoids, and Bovinine. Meat foods should, however, be taken sparingly, and should never displace milk. They supply but little energy to the body, and if indulged in freely are apt to cause flatulence and sometimes diarrhœa. They also increase the work of the already hard-worked kidneys. Small quantities are, however, useful by stimulating digestion and by encouraging the appetite with pleasant flavours and variety.

Stimulants.

The question of stimulants in fever is sure to arise, and it is not easy to give a definite rule as to their use; it is better in most cases to do without them unless they are ordered by the doctor, and their value in each case has to be decided by circumstances. For instance, if there is great exhaustion we should give them in small quantities and with care, feeling our way. Young children and old people are more commonly exhausted by disease, and therefore more often require stimulants in fever than strong adults. The effect of alcohol must be watched. If it moistens the tongue and improves its condition, brings the pulse rate nearer to the normal, causes perspiration, quiets the breathing, and produces sleep, it is doing good; otherwise it had far better be withheld.

Brandy is the stimulant most usually employed, and it must be of the best for use in illness. There is little choice between it and whiskey, and the patient's tastes and habits may be considered in deciding the point. Gin is sometimes useful, and has a decided action on the kidneys, increasing the flow of urine. Champagne is especially useful in severe exhaustion and in convalescence, but its action is more evanescent than that of the other stimulants.

Drugs.

No special drugs should be used in the treatment of fever, apart from those required for the condition producing it. Purgatives and simple medicines to keep the excretory organs (bowels, kidneys, skin) acting freely may be employed, but it is necessary to beware of the popular drugs used for the purpose of reducing fever, such as antipyrin, phenacetin, and others, as they are heart depressants, and should only be used under medical advice. Drugs, such as strychnia and digitalis, may be required for heart weakness and general exhaustion.

Hyperpyrexia.

A condition which may require instant attention is that of hyperpyrexia, or excessively high temperature. This condition is actually dangerous to life, and can best be subdued by the use of cold. It may be applied either by sponging the body all over, beginning with water at 90° and gradually reducing it to 70°, or even less. Another method is the "cold pack." The bed is cleared of clothes to the mattress; one or two blankets are spread over it; the patient is laid on them, and then wrapped up in a sheet wrung out of cold water and covered with more blankets. This causes a free sweat, and the patient's temperature should be watched and the sheet removed when it falls to 100°, or after it has been applied for about twenty minutes. The body should then be covered over quickly with warm, dry blankets. A more active treatment is the cold bath. The patient is put bodily into water at 90°, which is gradually cooled to 70°; the bath should last from fifteen to twenty minutes. The cold pack and cold bath are remedies that require great caution and judgment, and should only be employed under medical supervision.

Diagnosis.

It is always of the greatest importance to be able to decide as soon as possible as to the nature of the fever, both for the sake of the patient and for the safety of others. But in all cases this is difficult for the first few days, and the anxiety of the time when the patient is "sickening for something" has to be endured.

In the eruptive fevers there is great difficulty in forming a definite opinion until the appearance of the eruption, but some aid may be obtained if there is a prevailing epidemic or if one knows of an exposure to infection by some special complaint.

The onset of scarlet fever, small-pox, and typhus is sudden, that of measles and typhoid more gradual. If pain in the back is a marked premonitory symptom it makes us suspect small-pox or typhus fever; if headache, typhus fever or typhoid. Headache with diarrhœa ushers in typhoid, a cold in the head measles, a sore throat scarlet fever.

In connection with the eruptions, the date of its appearance from the first symptoms of illness is important. In chicken-pox it appears within the first twenty-four hours; if that period has passed, this complaint may be excluded. The rashes of scarlet fever and German measles appear on the second day, that of small-pox on the third, that of measles on the fourth, that of typhus on the fifth, and that of typhoid on the eighth or ninth. These various rashes select special situations for their first appearance. Scarlet fever affects the neck, German measles some part of the face, small-pox the same part, measles the forehead, typhus and typhoid the abdomen, and chicken-pox the body generally. When the eruption shows itself it soon settles the question of diagnosis, for chicken-pox appears as red pimples rapidly turning to blisters, scarlet fever and German measles as a red blush or minute red spots which soon run together, small-pox as hard red lumps rapidly forming matter, measles as red pimples arranged in crescents, typhus as a dusky mottling, and typhoid as scattered red pimples.

CHAPTER XXVIII

INFECTIOUS DISEASES

General Considerations—Toxins and Antitoxins—Methods of Infection—Septicæmia and Pyæmia—Influenza—Cerebro-spinal Fever—Diphtheria—Mumps—Whooping-cough—Erysipelas

GENERAL CONSIDERATIONS

BEFORE considering the various infectious disorders separately, a few words will be useful regarding infection, its nature and propagation.

The germ theory explains the occurrence of infectious disease by attributing it to the presence in the body of certain micro-organisms which are derived from the same disease in some other individual. The germs rapidly propagate themselves in the body of their new host, and produce virulently poisonous substances which give rise to the symptoms peculiar to the disorder. This theory necessitates the belief that every disease is produced by a special germ of its own, and the term " specific " is applied to such diseases for this reason. It signifies the peculiar nature of the causative poison, and implies that it can cause only one disease, and cannot under any conditions set up any other. Thus the measles poison can produce measles and measles only, and cannot possibly be so modified as to cause, let us say, scarlet fever or typhoid.

The germ theory itself is of but recent date, but more recent still is the knowledge that such diseases as rheumatism and inflammation of the lungs are germ-produced and are specific. It used to be considered that they, and many other complaints also, were produced by cold, and that the results of exposure to cold were determined by individual proclivities and weaknesses. This may be true still of many complaints, but it is only true in a modified sense of the specific diseases we are considering if we regard the presence of the germ as the essential factor.

But a natural criticism will lead us to wonder how the germ theory will explain the fact that all infectious diseases tend in time to get well. If the germs are in the body, and rapidly propagate themselves, in what way does the disease come to an end? Well, it is believed that the affected body has the power of producing an antidote to the poisons (or toxins) produced by the germs, and that these substances, which are hence called antitoxins, finally overcome and destroy the attacking organisms. In this way is explained the undoubted fact that one attack of an infectious disease protects the body for a longer or shorter period—varying with the affection—from the poison, and provides what is termed immunity. This theory is supported by the knowledge that the blood serum of an animal which has recovered from diphtheria has a distinctly curative power, and acts as an antitoxin, if injected into the body of a person suffering from that complaint. It may some day be possible to obtain an antitoxin of a similar nature for all disease germs, but at present only a few can be destroyed in this way. This may be because the antitoxins of diphtheria, though produced by germs, are dissolved in the blood serum, whilst those of other diseases remain in the cells of the micro-organism, and so cannot be reached.

Toxins and Antitoxins.

The next point to be considered is the method by which the infective poison is transmitted from the diseased to the healthy. To do this we must place the various disorders in separate classes. In one class the poison must be directly inoculated into the body, as in malaria, hydrophobia, and syphilis. In another it must be introduced with the food or drink, as in typhoid fever. In a third—a large class—it is diffused widely in the atmosphere, and is directly transmitted by the air and drawn into the body in respiration, as in scarlet fever, measles, and many other affections.

Methods of Infection.

Another matter of interest is the form in which the poison leaves the affected person. In cholera and typhoid fever it is contained in the dejections from the bowels, and, curiously, attains its greatest virulence only some time after it has left the body.

In most infectious fevers, such as measles, scarlet fever, whooping-cough, it is given off in the breath. In small-pox it is present in the discharge from the spots, in diphtheria in the expectoration, and in scarlet fever in the scales which peel off from the skin. Poison particles may be carried in the clothes or on the hands, and it is astonishing for how long a period they may retain their vitality and transmit disease. Scarlet fever has been known to break out again months after an illness, "caught" from clothes taken out of a drawer in which they had been placed at the conclusion of an attack.

The first of the infectious diseases with which we shall deal are

SEPTICÆMIA AND PYÆMIA

These diseases are forms of blood poisoning, and were of common occurrence in the days before wounds were treated by the antiseptic method. They are occasionally met with still. The germs find an entrance to the body through a wound, and by producing poisons in the blood set up a serious train of symptoms. They are distinctly contagious, spreading rapidly from one patient to another, and although they are more common in torn and bruised wounds, they may follow so slight an accident as a prick with a dirty pin. The symptoms are those of high fever, with rigors, sweats, and rapid exhaustion, whilst in pyæmia there are also abscesses formed in many parts of the body.

Much danger to life accompanies these conditions, and the case should at once be placed in the hands of a medical man. The wounds must be thoroughly cleansed and treated with strong carbolic, and the patient's strength supported by food, stimulants, and tonics, the most useful drug being quinine. Serum treatment has cured some cases.

INFLUENZA

This disease, called "la grippe" by the French, is an infectious fever which often appears in the form of an epidemic. It has been known for centuries, and visitations of it are recorded as far back as 1510 and every few years since; particularly severe epidemics swept over this country in 1837, 1847-48, and 1889-90. The disease is highly contagious, and spreads rapidly over a country; it has a special tendency to advance from east to west, even against the prevailing winds, and many epidemics have started from Russia (hence the name Russian fever) and spread, in the course of a few months, over the whole of Europe to England. The effect of atmospheric conditions on its appearance and dissemination is uncertain, but there is no doubt that it is far more virulent and widespread in the cold, damp months of winter than in fine, warm weather. It not uncommonly follows a sudden thaw or thick fogs, and disappears when the weather becomes dry, bright, and frosty. There can be no doubt that it is produced by a germ, and a small micro-organism has been discovered and cultivations of it have been made. It is found to grow only when blood is present in the medium in which it is cultivated, and injections of it have produced influenzal symptoms in animals. It is found in enormous numbers in the phlegm which is discharged from the nose and bronchial tubes of an affected person.

Influenza has the various stages which characterise other infectious fevers. The poison enters the system and remains quiescent for two to five days; this is the period of incubation or latency. The symptoms then break out, often with great suddenness, and the fever lasts, if uncomplicated, three, four, or five days, and then subsides.

Symptoms.

The symptoms of what may be considered an ordinary attack are severe aching in the head and eyeballs, pain in the back and limbs, with a feeling of soreness and tenderness as if the body had been beaten and bruised, and high fever. These may form the only symptoms, but one of the peculiarities of influenza is the strange variety of forms which it assumes and the many organs it may involve, either singly or at the same time. The most common are catarrhal conditions of various parts, a severe cold in the head with watery, reddened eyes; hard, dry, irritable cough; sneezing, with soreness of the nasal passages, followed later by a profuse, irritating, watery discharge. To this last condition it was common to apply the term influenza, but now that the origin of influenza proper is recognised it is incorrect to call a simple severe cold in the head an influenza. The influenza catarrh is liable to spread from the nose and throat along the mucous membranes, up the Eustachian tubes, producing earache and acute inflammation of the middle ear; along the eye ducts to the conjunctiva, setting up a watery, bloodshot condition of the eyes; or downwards through the windpipe to the bronchial tubes and lungs.

This is one type of influenza, and the complications affecting the air passages are the commonest of the many met with, for acute bronchitis and pneumonia are exceedingly likely to affect those who in any way neglect an attack. Other epidemics seem particularly prone to settle on the digestive organs; the symptoms are then great pain in the stomach with excessive vomiting and diarrhœa. When the nervous system is the part involved, there is intense headache, with drowsiness and severe delirium, followed by great depression of spirits, neuralgia and neuritis in all parts of the body, and in some cases even paralysis. The heart also is liable to attack, the pulse becomes irregular and weak, pain is experienced in the heart region, and there is a great tendency to faint.

Whatever form the disease may take there are certain symptoms which are always present: these are fever, headaches, pains in the limbs, and severe prostration, the last being very characteristic of the disease. The fever runs no particular course; it may last for only three or four days or run on for three weeks, and is very liable to return if any liberty is taken. Many a relapse is due to getting out of bed too soon. The influenza headache is often agonising, and felt chiefly in the forehead and eyeballs, and the pains and aches are so peculiar as at once to arouse suspicion of their influenzal origin. However, both headache and pain only last, in straightforward cases, for two or three days, and rapidly subside as the fever disappears. The prostration caused by the influenza poison is excessive, and quite out of proportion to the severity of the illness. The body wastes rapidly, and, as the result of a few days' illness, is left in a condition of extreme debility from which it may take months to recover. This provides a very definite indication to avoid all depressing forms of treatment.

One attack of the disease gives no protection against infection; indeed, the great debility it produces renders some persons more prone to become its victims, and it is a very common experience for a series of attacks to follow one another at short intervals. The only preventive treatment is to keep away from contagion, but this is almost impossible in epidemic outbreaks. There is great risk of taking the poison in the sick room of a feverish patient, for it is then in a concentrated and virulent form, and many attacks can be traced to visits to public performances in ill-ventilated rooms or to sitting in a crowded and stuffy railway carriage.

Fresh air is a trustworthy disinfectant and probably more efficacious than eucalyptus or any other drug. It is of great importance to maintain the body in good condition, and thus be fortified against the poison, and it is probably in this way that the popular preventive, ammoniated tincture of quinine, proves beneficial. It may be taken in teaspoonful doses three times a day, mixed with half a wineglassful of water or, better still, soda water, as the latter keeps the quinine in solution.

Treatment.

The treatment of influenza is both simple and effectual. Directly the symptoms of the disease show themselves the patient should take to his bed, and give both body and brain complete rest. To struggle against the attack is only to aggravate it; every day's struggle will very likely mean three more spent in bed later, and during the struggle some slight chill may be caught and bring on a serious and perhaps fatal complication. The most certain way of shortening an attack, of avoiding complications, and reducing the subsequent prostration, is to take to bed, get thoroughly warm, and take some such medicine as the following until all fever has entirely disappeared :—

PRESCRIPTION 135

Solution of acetate of ammonia	2 ounces.
Salicylate of soda	80 grains.
Bromide of potash	80 grains.
Bicarbonate of potash	2 drachms.
Tincture of cardamoms	2 drachms.

Chloroform water to 8 ounces.

An eighth part to be taken every 4 hours.

This should be taken until perspiration is produced and the fever grows appreciably less, when the doses may be taken every six hours, then three times a day, and finally the medicine may be discontinued. If the cough is troublesome, 15 drops of paregoric elixir or a teaspoonful of glyco-heroin must be added to each dose of this mixture.

When the pains in the limbs are excessive and unrelieved by a few doses of the mixture, two 5-grain tablets of aspirin may be taken alternately with the mixture. A hot bath will be found comforting. Great care must be taken to avoid chill, and the bed must be well warmed before getting into it. For great prostration, weakness of heart, and feeble pulse 5 drops of tincture of digitalis and 10 drops of tincture of nux vomica may be added to each dose of the mixture.

During the feverish stage the diet must be ample and nutritious, and limited to fluids or soft solids, such as milk and milk foods, egg flip, light meat soups, and other invalid foods. Plenty of fluid is useful, as it encourages perspiration and lowers the fever. When the temperature falls, solids should be gradually added, and during convalescence careful feeding is of great importance. It is then that some stimulant will be required—a couple of ounces of old brandy may be taken daily, and later a glassful of good port wine twice daily. Tonics will help to restore the strength and shorten convalescence, the bark and ammonia (Pr. 98) and quinine and iron (Pr. 77) mixtures both being suitable.

The treatment of complications need not here be considered, as they are described under their respective headings. It is well to isolate a patient suffering from influenza, and allow admission to the sick room only to those who are in attendance; and this precaution is of especial importance during the stage of high fever. After an attack the infected rooms and clothing should be thoroughly disinfected and well aired.

CEREBRO-SPINAL FEVER

This is an infectious disease not very common in this country, and which has only been recognised as a distinct disease since the beginning of the last century. It is believed to be dependent on a special germ or "diplococcus," but some cases are apparently caused by the germ of pneumonia. This poison sets up an inflammation of the membranes of the brain and spinal cord, and the germ is found in the cerebro-spinal fluid. The disease is predisposed to and often caused by exposure to cold, and chiefly occurs in the winter and spring months, and amongst the children and young adults whose circumstances are poor and unhealthy. It breaks out in epidemic form where many persons live together, as amongst children in schools, the poor in workhouses, or soldiers in barracks. The affection spreads in an irregular and uncertain way, appearing and disappearing by fits and starts, and the means by which it is transmitted are not thoroughly understood. It may, in rare cases, pass directly from one person to another, or be carried in the clothing, but has not been traced to bad drainage, food, or water. Occasionally only a few cases appear in a district, and the disease spreads no further; at other times distinct epidemics develop, but are not widely diffused.

Cause.

The course of the disorder is very uncertain and irregular. In cases of the fulminating or lightning type, the symptoms are sudden and very severe, and death may occur in a few days; other cases—and these form the ordinary type—are more prolonged and last for weeks. The first symptoms to appear are headache, pains in the back and limbs, chilliness often amounting to a severe rigor, and high fever; vomiting also is common. The headache is very acute, and is felt most in the back of the head; it spreads down the back and into the limbs; excessive tenderness is also felt in many parts of the body. Next, stiffness at the back of the neck sets in, and gradually passes down the back; the muscles of these parts grow hard and rigid, the head is drawn back, the back stiffened and arched, and the pain intense. With these symptoms the mind wanders, delirium sets in, and may become most violent. This passes gradually into unconsciousness and stupor, deepening in many cases into coma, during which death may occur. If, however, the patient recovers from these symptoms, he may pass on slowly into convalescence, but

Symptoms.

in a greatly emaciated condition, and many months will elapse before the health is restored.

Certain other symptoms must be mentioned, as they are of common though not universal occurrence. Skin eruptions are of great frequency. One, formed of small blisters, is called herpes, and one of blood spots, purpura, and the latter symptom has given to the disease its name of "spotted fever." In some cases also inflammation of the eye, of its nerve, of the cornea or iris, may lead to permanent blindness, or inflammation of the ear to complete loss of hearing, and inflammation of various nerves may cause facial palsy, squint, drooping of the lid, and other troubles.

Treatment.

For the treatment of the complaint no special remedies are known. The patient must be put to bed in a cool, quiet, darkened, and well-ventilated room, and carefully fed with milk, milk foods, and strong broths, and with brandy or whisky in small quantities when depression and exhaustion show themselves. Broken-up ice in a waterproof bag should be applied to the head and along the spine. The one drug of value in the acute stage is opium or its derivative, morphia; ¼ of a grain of the former in a pill, or ⅙ of a grain of the latter, under the skin, may be given every two hours until the pain and restlessness are relieved. After the acute symptoms have subsided, iodide of potash and tonics are required.

PRESCRIPTION 136

Iodide of potash	24 grains.
Compound tincture of bark . .	3 drachms.
Syrup of orange	½ ounce.

Water to 8 ounces.

An eighth part to be taken 4 times a day.

Cold packs and sponging are useful to reduce the fever if it rises very high, and in milder cases the pain and fever can be relieved by frequent warm baths and the following mixture :—

PRESCRIPTION 137

Salicylate of soda	1½ drachms.
Bromide of potash	1½ drachms.
Tincture of cardamoms . . .	2 drachms.

Chloroform water to 8 ounces.

An eighth part to be taken every 4 hours.

DIPHTHERIA

The name of this disease means a "pellicle," and was given to it in 1821 by Bretonneau, from the formation on the parts affected of a membrane which is characteristic of the disease. Although the affection must be looked upon as "one of the oldest epidemic diseases of the human race," and has been known to occur at various times all over this country, the earliest well recognised epidemic takes us no farther back than 1855. It was then brought across the English Channel from the French coast, and received the name of "Boulogne sore throat," and has since remained a fairly constant visitor, showing itself in one part of the country or another in localised epidemics. The complaint was recognised throughout the Middle Ages, but was confused with many others, there being no means of discriminating between them. Since 1883, however, it has been proved that diphtheria is due to the presence of a special bacillus, now called after those who first described it (Klebs-Löffler). Other diseases, in which the bacillus is absent, give rise to very similar membranes and symptoms, and these also are contagious and sometimes followed by similar after-effects. It is these similar yet not identical conditions which cause so much difficulty in the recognition of diphtheria. They are caused by other bacilli which are called "pseudo-diphtheria bacilli," and the only certain point of distinction is the variety of bacillus present in the membranes or discharges from the affected parts, a distinction which can only be made by a bacteriologist. In this connection it is interesting to know that occasionally the true bacillus may be discovered in perfectly healthy throats, and in persons who show no symptoms of illness.

Cause.

The most usual place for the bacillus of diphtheria to take root and form a false membrane or pellicle is the mucous membrane of the throat, but it may form on the lining of the windpipe and nose, or, indeed, any mucous membrane, and even on a raw surface of the skin. During its growth at the seat of its inoculation the germ produces most virulent poisons—toxins—which enter the blood and give rise to the severe general symptoms, including high fever, which accompany this complaint.

It is highly contagious, and spreads rapidly from person to person by direct transference of the germ. It is frequently passed from a patient to his nurse, from one patient to another in a hospital ward, and from a sick child to its parents or playmates. Many an attack can be traced to the transmission of the poison by discharge or membrane being coughed into the face of those in attendance on the sick person, and it is in this way that diphtheria of the eye is usually started. In some rare cases it has resulted from sucking the wound in the throat, or the tube used after tracheotomy, with the intention of removing the membrane. It is quite certain that the infection can be carried on the hands or clothing of a third person from the sick to the healthy when disinfection has been neglected. There is also no doubt that the domestic cat is a source of danger as a carrier of infection. It may carry it in several ways. It may be admitted to the sick-room of a child, and then pass to other parts of the house, carrying contagious particles on its body, or it may itself fall a victim to the disease and transmit it to its human friends, or it may hand it on to other cats, who may convey it to other houses. The germ attaches itself to the bedding, furniture, and walls of the sick-room and shows wonderful tenacity of life, being said to have remained alive for as long as five months on a child's toy kept in the dark.

Transmission.

Children are far more susceptible than adults, especially during the periods when they are attending school, and it is proved that the aggregation of a large number of children, as at school, is one of the commonest means of spreading the disease. Many epidemics have been traced to the dissemination of the poison in milk which has become contaminated by exposure in an infected house, or which was taken from a diseased cow. The popular belief that diphtheria is conveyed by sewer gas and insanitary conditions of the drains is probably fallacious. The bacillus has never been discovered in sewer air, and only a small number of attacks can be traced to this mode of infection, or to contamination of the water supply.

A very powerful predisposing cause is individual susceptibility, which runs in families, and liability may often be developed by falling into a condition of enfeebled health, in which the protective power of the body is much weakened.

The bacillus enters the body either in air during respiration, in food, or by direct inoculation, but only seems to take root in prepared soil. One condition favourable to it is a slight sore throat or some catarrh of the throat, nose, or air passages, and this is considered to explain cases associated with the presence of sewer gas in houses: by causing sore throat the sewer gas prepares that part of the body for infection by the bacillus.

There is an unexplained variability in the strength of the poison which shows itself in different epidemics. Some are characterised by great virulence, spreading rapidly and widely, and causing many deaths, in some instances carrying off whole families. In one case given by Trousseau the residents of a single farm, numbering eighteen, were all carried off except two, the father and a servant girl. After a virulent epidemic the strength of the infection gradually dies down, and for some years the district affected remains comparatively free from the disease. Other epidemics are characterised by the mildness of the attack and the very slight mortality caused by it.

Symptoms.

The incubation period varies from two to ten days, but is oftenest only two. The first symptoms to show themselves are due to the local affection, and, as diphtheria usually appears in the throat, takes the form of a soreness of this part. The throat is reddened and there is pain on swallowing, but the soreness is often very slight. On the affected part, most commonly the tonsil, a patch of membrane forms, and gradually spreads to surrounding parts. This has a dirty grey or yellowish-white colour, and is firmly fixed to the mucous membrane, can only be separated with difficulty, and then leaves behind it a raw, bleeding surface. Accompanying this there is fever, which may rise during the first twenty-four hours to 103°, and is associated with drowsiness, irritability, aching in the back and limbs, and digestive disturbance, but often such symptoms are not sufficiently severe to make the patient go to bed.

As the disease advances other symptoms show themselves. The breathing is often difficult, the mouth kept open, and a snoring noise accompanies each breath; these symptoms are especially marked if the membrane spreads into the larynx and windpipe. If, on the other hand, it passes upwards into the nose, it causes running from the nostrils, sneezing, and bleeding. Poison passes from the inflamed throat to the lymphatic glands at the angle of the jaw and at the sides of the neck, and causes their enlargement, so that it is painful to move the neck.

The course of an attack varies according to the direction in which the local disease spreads. If it extends into the larynx it produces what is called diphtheritic or membranous croup. This is shown by the development of hoarseness, which grows gradually more severe until the patient can only speak in a whisper. At the same time the breathing grows more difficult and noisy, is carried on with much effort, and is accompanied with a troublesome husky, or, as it is called, "croupy" cough. This is a dangerous condition, for at any time the obstruction may become so great as to cause suffocation, especially in children in whom the passage is very small. This fatal issue is preceded by violent efforts to obtain air and by blueness of the face.

When diphtheria affects the nose as well as the throat it indicates a severe attack and much danger. The nose is blocked up, and there is a mattery discharge, often mixed with blood, and very irritating to the skin. The disease may spread up the nasal ducts to the eyes.

The general symptoms besides the fever must be looked upon as complications of an attack rather than a necessary part of it. The presence of albumen in the urine is common, and is a sign of inflammation of the kidneys set up by poison in the blood; it occurs within the first ten days, and gradually passes off in most cases during convalescence. Vomiting is often connected with it, and adds to the patient's danger. Paralysis is another peculiar symptom of diphtheria, and may come on at any time, even weeks after the complaint seems to have quite disappeared; it is set up by the blood poison, and is due to an inflammation of the nerves (neuritis). It most commonly affects the muscles of the throat and its neighbourhood, such as the palate, and there is often loss of sensation also. When the patient speaks through his nose, has fluids passing up into it when he drinks, and troublesome attacks of coughing and choking through food "going the wrong way," it is pretty certain that it is due to paralysis and loss of sensation in the throat. This complication, if limited to the throat, will gradually pass off as the disease subsides, but paralysis may appear in other parts, and is not uncommon in the legs and arms. These become tender and increasingly helpless, and the muscles waste rapidly. When the eye muscles are paralysed the sight is affected, or there is squint or drooping of the upper lid. The paralysis does not often cause death, although it may do so if the muscles of the heart or of respiration are affected, but usually it passes off gradually, taking sometimes many months entirely to disappear.

One of the great dangers of diphtheria is its tendency to attack the heart and cause heart failure. In such cases the pulse becomes weak and irregular, sometimes very rapid, at others exceptionally slow; the face is pale, the breathing is oppressed, and the heart palpitates. The condition may come on at any time during the illness, often in its acute stages, but occasionally when convalescence seems to be quite established. It is one of the chief matters to be kept in view throughout the treatment of a case.

From this description of the symptoms, an attack of diphtheria, it can be well understood, is full of anxiety, and a fatal issue may result from a spread of the membrane into the larynx, causing suffocation, from an overpowering dose of the poison producing rapid exhaustion, from failure of the heart, or from paralysis of the muscles of breathing. With such dangers to be met no one would attempt to treat diphtheria without skilled medical advice, except from absolute necessity.

Treatment.

The patient should be at once isolated with his nurses in a room properly prepared for an infectious illness. He should, of course, remain in bed, and the room be kept well ventilated and at a temperature of 65°. A bronchitis kettle should be placed on the fire, and the air kept moist by the steam passing into the room as near as possible to the bed. The food should be light and nutritious, and should be given every two hours during the day and every three hours at night. Milk is the best food, and must be given freely, and supplemented with farinaceous foods, beef tea, and meat soups. Plenty of fluid should be taken, water in as large a quantity as possible, with barley water, albumen water, and similar drinks. If there is much exhaustion or sign of heart failure, brandy must be added in small quantities to the foods. The great tendency of the complaint is to cause exhaustion, and it is therefore of the utmost importance to sustain the strength. If the patient cannot swallow he must be fed by injections into the bowel or by a tube through the nose.

Antitoxin Treatment.

A wonderful change has come over the treatment of diphtheria since 1893, when the antitoxin method was introduced. Antitoxin is a substance produced in the blood of an animal that has been rendered proof against an attack of diphtheria by gradually increasing doses of the poison. The serum is prepared by infecting a horse or other animal with doses of the diphtheria poison. On recovery from the complaint thus produced the animal is found to be "immune," or protected, against diphtheria, and if its blood-serum be injected into a person suffering from the disease this acts as an antidote to the poison, lessens the severity of the attacks, and greatly increases the chances of recovery. It is of the utmost importance that the remedy should be used as early as possible in every case of diphtheria, and no time should be lost even if the nature of the case is uncertain; if a suspicion of diphtheria arises the antitoxin should be given, for an unnecessary dose can do no harm, severe itching or nettle-rash being the worst consequences likely to arise. The antitoxin is injected by a special syringe under the skin of the abdomen or back. Within twenty-four hours of the injection the throat trouble rapidly subsides, the fever grows less, and the general condition of the patient improves. The mortality of the disease has been wonderfully reduced, and this once dangerous malady has in consequence lost much of its terror.

In cases where antitoxin cannot be obtained, or in the interval whilst it is being procured, other treatment can be carried out. Disinfectants may be applied to the affected surface. A chlorine gargle may be obtained from the chemist and used freely by those old enough, or a spray of boracic acid, 15 grains to an ounce of water, may be employed frequently. A better method of applying antiseptics, especially in young children, is with a swab of cotton wool tied on to a stick or penholder. A 3 per cent. solution of carbolic acid is suitable, or the following lotion:—

PRESCRIPTION 138

Tincture of steel	1½ drachms.
Glycerine	1 ounce.
Carbolic acid	15 drops.
Water	1 ounce.

For application to the throat.

Pieces of ice may be slowly sucked, and hot poultices and fomentations applied to the throat relieve the discomfort. Medicines exert no great effect on the course of the illness, but a tonic mixture may be of use by maintaining the strength and improving the action of the heart. Tincture of steel and strychnia are the drugs chiefly recommended, as in the following:—

PRESCRIPTION 139

Tincture of steel	80 drops.
Solution of strychnia . . .	24 drops.
Glycerine	½ ounce.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 or 4 times a day.

The treatment of complications involves prolonged rest in bed until recovery is fully established. The paralysed muscles must be treated also with gentle massage and electricity.

In those cases in which the membrane spreads down the windpipe and threatens suffocation, it may be necessary to have the operation of tracheotomy performed. It consists in making an opening into the windpipe some little distance below "Adam's apple," and fixing in a tube made of silver or indiarubber. This allows air to enter below the small and obstructed opening of the glottis, and the effect it often has is marvellous: the child who was struggling in terror, or almost unconscious, with his face blue and bathed in sweat, and every muscle of his body in violent action, lies breathing quietly and easily, fast asleep, or playing happily with his toys. Much as a parent's feelings may turn against an operation, no one who has seen the beneficial effects of this procedure would ever refuse to give his child this chance of life. But though many a life is saved by tracheotomy, the operation does not prevent the spread of membrane downwards along the air passages below the opening made by the surgeon's knife, and suffocation may ultimately cause death. Since the introduction of antitoxin for treating diphtheria tracheotomy is much less often necessary than it was before.

Tracheotomy.

Not only should the patient and his nurses be completely isolated, but strict precautions should be taken to prevent the poison from being carried by draughts of air into other parts of the house. This is best done by covering the doorways with sheets well wetted with disinfectants. All expectoration and discharges should be carefully wiped up with lint, cotton wool, or rags, which should be at once burnt; and all china, glasses, and other articles used in the sick room should be placed in boiling water or disinfectant. These precautions are of equal importance during convalescence.

Precaution against Infection.

All young members of the family should be sent away from the house as soon as the disease makes its appearance, and should be treated as suspects and prevented from associating with others for twelve days. After the illness the rooms and everything in them should be thoroughly disinfected. As a simple sore throat produces a special liability to diphtheria, it is of great importance to cure such an affection without delay if the disease is known to be in the neighbourhood. All causes of sore throat should be avoided, and those who have a family predisposition to it should not, if they can help it, live in localities exposed to cold, wet winds, or in which the soil is damp and the sanitary arrangements doubtful. Sunlight and fresh air are excellent preventives. The infection of milk can be obviated by scalding or cooking all that comes into the house, for a temperature of 140° for five minutes will destroy the bacilli.

The question of school attendance is of the first importance, but a very difficult one. The Medical Officers of Schools Association require a period of quarantine of twelve days from the latest exposure to infection before the child is allowed to return to school, and after an attack four weeks from the commencement of the illness must elapse, and the child is only re-admitted then if there are no discharges from the throat, nose, or other parts, and no albumin in the urine, and if the report of a specialist declares that an examination of swabs of mucus from the throat and nose shows a complete absence of the special bacillus. So great is the vitality of the germ that it has been found in the throat of a child, otherwise perfectly healthy, months after recovery from diphtheria, and yet the poison is capable of reviving and infecting others.

Quarantine.

MUMPS

The medical name for this complaint is epidemic parotitis, and in Scotland it is popularly called "the branks." It consists of an infectious form of inflammation of the salivary glands (p. 52). The parotid gland at the side of the face is usually first affected, but the affection soon spreads to the other glands under the jaw, and often as one side is recovering the other becomes involved. The disease occurs in epidemics, especially amongst children and young persons. It is probably caused by a germ, but none has yet been demonstrated. The infection spreads rapidly, and the disease can be caught throughout its whole course, even before the swelling of the glands is evident. There is very little danger attached to it, but in a few cases certain complications arise, so that no case should be treated with indifference. Between the time of exposure to infection and the first occurrence of symptoms—that is, the incubation stage—from fourteen to twenty-five days intervene, so that it is often very difficult to trace the source of the poison.

The first symptom is usually fever, which may rise to 101°, with chilliness and headache. This is soon followed by stiffness, pain, and tenderness below one of the ears. Swelling of the part follows, and gradually increases for the next day or two, spreading to the side of the face, down into the neck, and often along under the jaw. After a few days the other side of the face is liable to be similarly affected, and the appearance is much altered, the face

Symptoms.

being widened and the chin lost in the swelling. The parts are so tender that it is difficult to speak or swallow, and biting is almost impossible. The swelling remains at its height for a day or two, and then gradually subsides, disappearing altogether in about ten or twelve days; although this time may be exceeded by the second gland only being affected when the other has quite recovered. Sometimes the hearing may be affected, and there may be earache, but the pain is not usually severe. The general health is not much impaired, and recovery is complete and rapid. But some curious complications may arise, in which the inflammation may suddenly attack other and distant parts of the body. Some of these complications are only painful, but others may leave permanent injury, whilst in rare cases in which the membranes of the brain are inflamed there is great danger of a fatal issue. The disease can be distinguished from swelling of the glands of the neck by its situation, as it spreads much more over the side of the face.

Treatment.

Cases of mumps should be treated in bed until the fever has disappeared, and the patient should be confined to the house until all swelling has subsided. There is danger of complications if there is exposure to cold or the case is otherwise neglected. The diet must be fluid and nutritious; milk, strong soups, jellies, and beaten-up eggs are suitable, as they require no biting. No medicine is necessary unless the fever is severe, when the following may be taken:—

PRESCRIPTION 140

Solution of acetate of ammonia .	1 ounce.
Tincture of aconite	16 drops.
Syrup of lemon	½ ounce.

Water to 8 ounces.

An eighth part to be taken every 4 hours (for a child of 10 years).

The bowels must be kept regular by some mild aperient medicine. Locally nothing is more comforting than a hot bread poultice or fomentation. The swollen parts may also be smeared with belladonna liniment, or with equal parts of extract of belladonna and glycerine. They should be kept covered with a piece of cotton wool and a flannel bandage.

The complications are hardly suited for domestic treatment; they require the measures mentioned elsewhere for inflammation of the parts.

A child suffering from this complaint must be isolated from others, and considered infectious for three weeks from the commencement of the illness and for a week from the disappearance of all swelling in the glands. One who has been exposed to infection must be looked upon as liable to develop the disease for twenty-five days from the last exposure.

WHOOPING-COUGH

This complaint, technically termed pertussis, is very infectious, and breaks out in severe epidemics in the spring and autumn. It is

Cause.

believed to be caused by germs, but though many have been discovered, the specified organism has not been definitely recognised. The infection is present in the breath and expectoration of the affected persons, and is freely transmitted. Although it may be carried from house to house by the clothes and be spread by domestic animals, yet in most cases it requires more intimate contact, such as occurs when children play together, kiss one another, or sit close together at school. One reason why the disease spreads so rapidly is that its contagiousness is very marked in the early stages before the peculiar cough has developed. The affection is often very difficult to recognise, and may have lasted for weeks before the "whooping" which gives the disease its name is started. It is, for the most part, a disorder of childhood, chiefly attacking those under ten years of age, and the younger and more delicate the child the greater is the danger attaching to the illness. One attack, as a rule, gives protection for the rest of life. The disease is not unknown in adults, but is then more troublesome than dangerous, and is usually devoid of the serious complications that are met with in children.

As we have said, it is more particularly young children who suffer, especially those who are delicate or who are in a state of debility, such as is left by some childish illness. Measles is a very frequent precursor of whooping cough, and, by the debility it leaves behind it, renders a child very liable to infection. It is important to realise that whooping-cough is a serious complaint and the cause of a very large number of deaths, practicallv all of which are caused by complications rather than by the disorder itself. Cold and damp are sure means of exaggerating the symptoms of catarrh and of increasing the danger of complications, so that it is neglected cases that provide the majority of fatal cases.

The period of incubation varies from four to fourteen days, but in

Symptoms.

most cases is from seven to ten days. The illness then comes on with symptoms of an ordinary cold, running at the nose, sneezing, watery eyes, and an irritable dry cough. The temperature is slightly raised, perhaps to 101°, in the evening, the child is somewhat dull and languid, and the digestion is disturbed, producing want of appetite and furred tongue. Little attention is paid to such symptoms, and they continue for a few days or several weeks. However, the cough, instead of disappearing, gradually grows more troublesome, and the sleep may be disturbed by its frequency during the night. This is an important point, and the more so if the attacks of coughing come on with great suddenness and continue until the little sufferer gets red in the face. Another suspicious symptom is that the child grows nervous and excitable, cannot keep quiet, soon grows tired of each of his toys in turn, and is peevish and irritable. After a time doubt is set at rest by the cough, probably at first during the night, assuming its peculiar character. The cough of this disorder is, when well established, almost unmistakable. It comes on with extreme suddenness, begins with a dozen or more short, sharp coughs in rapid succession, during which the child grows red or even blue in the face, and seems in imminent danger of suffocation. These are followed by a long, deep breath, by which the air is drawn into the now empty chest through the narrow opening of the windpipe, producing the curious crowing or "whooping."

The cough generally ends by the expectoration of a quantity of stringy phlegm. The paroxysms of cough return at indefinite intervals; in a mild case there may be but four or five, or even fewer, in the course of the twenty-four hours, whilst in bad attacks they return as often as every half hour. It is very common for the paroxysm to terminate with vomiting; the stomach is then emptied of its contents, which may consist of food or only a large quantity of thick mucus, and much mucus also is ejected with it from the air passages. Occasional attacks of vomiting are of no moment, and the child is soon quite himself again and able to take another meal. But if the trouble be frequently repeated, it may lead to great difficulty in the feeding, and the child may rapidly waste from want of nourishment. The cough is exceedingly exhausting, and the little patient does his very utmost to stave it off, struggling with all his might to control the intense irritation. Finally, when the desire to cough becomes uncontrollable, he rushes in terror to his mother or nurse and clings to her for support until the paroxysm has spent itself; then, worn out with fatigue and wet with perspiration, he sinks into her lap, and either drops into a heavy sleep or, rapidly recovering, returns to his toys. Headache is a frequent sequence of one of these violent bouts. The spasmodic stage of whooping-cough lasts, on an average, for about a fortnight, varying according to the severity of the attack and the nature of the treatment. The cough is brought on by nervous disturbance, by fits of crying, by lying down in bed, and by any irritation of the throat, as from a close, dusty atmosphere, and even the act of swallowing may sometimes be sufficient to start it.

Complications.

Various complications are likely to arise. The violence of the cough may produce a rupture in those at all predisposed to it, and bleeding from various parts, owing to the intense congestion of the blood vessels. Hæmorrhage may occur in the skin, especially about the forehead, forming an eruption of little blood spots; from the nose, from the lips and gums, into the conjunctiva, or even into the brain, causing convulsions and paralysis. Convulsions, indeed, are not uncommon; they may often be of no importance, and leave the patient no worse when they have subsided, but they may indicate the onset of other serious complications, such as acute bronchitis or inflammation of the lungs. The affections of the breathing organs which come on in an attack of whooping-cough are very serious, and the cause of many deaths. They are most common in infants, and as the result of exposure to cold. Collapse of the lung is one of the most serious, and is caused by a blocking of the small tubes with thick mucus, so that the air cannot enter the air cells. If the child suffers from rickets all these troubles are more liable to arise. Digestive disturbances are a frequent complication, such as vomiting and diarrhœa, with the passing of large quantities of slimy mucus. A curious condition which is frequently seen is a small sore spot on the cord under the tongue, produced by scraping against the front teeth in the efforts of coughing. It is of no importance, but is of interest because at one time it was believed to be the cause of the disease. The nervous system is in a peculiarly sensitive condition in this complaint, and certain complications are thus explained: a closure of the windpipe, called spasm of the glottis, may come on and place the child in extreme danger of death from suffocation. The patient is reduced in many cases to great debility, and convalescence, which comes on gradually, is often prolonged for many weeks in consequence. The average time, however, for an attack to last is about six weeks, and even in those cases which last longer the infectious nature of the illness is considered to cease in from five to six weeks from its first appearance. The code of the Medical Officers of Schools has it that the period of infection ends five weeks from the commencement, provided all characteristic spasmodic cough and whooping have ceased for at least two weeks; and that it is necessary to keep a child in quarantine for three weeks from the latest exposure to infection before he can be declared safe and fit to associate with other children. It is believed that those cases which are very prolonged—perhaps even to ten weeks—are complicated by the presence of adenoid growths in the throat, the irritation of which keeps up the cough.

Treatment.

As the treatment of the disease has to extend over so long a period, it is always a difficult question to decide how long it is necessary to keep the patient confined to the house, especially as the health is likely to be already impaired, and the confinement, with loss of fresh air and exercise, may be injurious. However, cold and damp are the chief causes of the dangerous complications, besides increasing the severity of the cough and prolonging the attack. As the disease most frequently occurs in cold, wet, inclement weather, it will be exceedingly unwise to follow a somewhat common custom and send the patient daily out of doors. For the first few days, whilst there is any fever, it is necessary to keep him in bed, and after the fever has disappeared to restrict him entirely to the sick room until the violent spasmodic cough has abated. It is an excellent plan to give up two rooms, at the top of the house, for night and day use, where that is possible. These should be thoroughly warmed and ventilated, for fresh, warm air is conducive to recovery. The occupied room must be warmed with a fire and kept at 65°, whilst the unoccupied one has the windows thrown wide open, thoroughly to purify it, but it must be again warmed up to the proper temperature before the child returns to it. If the rooms do not communicate great care should be taken to wrap him up in a blanket whilst in transit.

When free from fever he must be dressed warmly, and it is a good plan to cover the chest with a little jacket of gamgee tissue. Washing should be carried out with the greatest precautions against chill, and in front of a good fire. His time must be occupied with picture books and simple games, all excitement being avoided and lessons dispensed with until the illness is well on the wane. The diet must be entirely fluid in the feverish stage—milk and broths—but later must be nutritious, must be given frequently in small quantities, and must consist of easily digested, simple foods; starchy substances should only be allowed in moderate quantities, and sweets, jams, and fruits not at all.

When vomiting occurs, it is well shortly afterwards to give a small meal of warm milk and water, or Benger's food, so as to maintain the nutrition, but if the digestion is much disturbed or the sickness excessive, nutrient injections must be employed until food can again be taken.

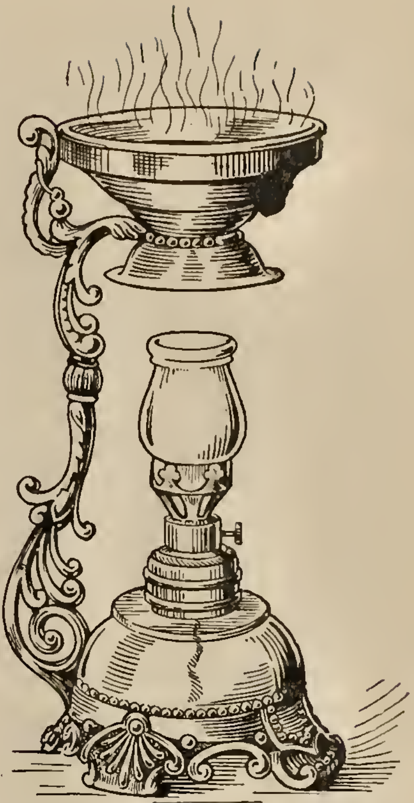


Fig. 52.—Cresolene Vaporiser.

As the disorder is possibly germ-produced, it is wise to keep the air of the sick room charged with suitable antiseptics; this can be done by burning in it a small spirit lamp under a metal vessel containing some antiseptic, which is thus constantly volatilised. For this purpose the best drugs are creasote, carbolic acid, eucalyptus, or cresolene, the last being particularly convenient, as it can be obtained from any chemist's with the little lamp requisite (Fig. 52). The drugs may also be vaporised by heating a small quantity in a large spoon. Sprays into the throat are another useful mode of applying antiseptics, and this prescription will be suitable:—

PRESCRIPTION 141

Glycerine of carbolic acid . . .	1 drachm.
Bicarbonate of soda . . .	10 grains.
Water to 1 ounce.	

To be used in a spray for 10 minutes every 2 or 3 hours.

Or

PRESCRIPTION 142

Resorcin, 2 per cent. solution . .	1 ounce.

To be used as a spray for a minute every 2 or 3 hours.

In the feverish stage the following medicine should be given:—

PRESCRIPTION 143

Solution of acetate of ammonia .	3 drachms.
Oxymel of squills	½ ounce.
Ipecacuanha wine	½ drachm.
Tincture of orange	2 drachms.
Syrup	½ ounce.
Water to 3 ounces.	

A teaspoonful for a child of 3, a dessertspoonful for one of 6, every 3 or 4 hours.

For the spasmodic stage a very large number of drugs have been recommended. None of them is certain to cure, but the following are some that have been highly recommended:—

PRESCRIPTION 144

Butyl-chloral hydrate . . .	12 grains.
Bromide of potash	24 grains.
Syrup of lemon	2 drachms.

Water to 3 ounces.

A dessertspoonful to be given every 2, 3, 4, or 6 hours according to the age of the child (Dr. Eustace Smith).

PRESCRIPTION 145

Powdered belladonna root . .	1½ grains.
Sulphate of quinine	8 grains.
White sugar	½ drachm.

To be divided into 10 powders, one to be given 3 times a day (Dr. Widerhofer).

PRESCRIPTION 146

Euquinine	6 grains.
Syrup	½ ounce.

Water to 3 ounces.

A dessertspoonful to be given with lemon water 3 times a day (for a child one year old).

PRESCRIPTION 147

Bromoform	10 drops.
Tincture of senega	½ ounce.
Syrup of orange	½ ounce.

Shake well and gradually add

Water to 6 ounces.

A dessertspoonful for a child of one year, a tablespoonful for one of 4 years, 2 tablespoonfuls for one of 6 years, 3 times a day. Shake the bottle.

The last is considered particularly efficacious, but is decomposed by light, and therefore the bottle must be kept in the dark.

If there should be a large amount of phlegm, shown by the sound of the cough, much relief may be obtained by rubbing the chest, back and front, with some stimulating liniment, such as the compound camphor liniment, or with the ointment called antitussin, until the skin is well reddened.

In long-continued cases great benefit will be obtained by a change of air to a warm, dry, bracing place, but this cannot be easily carried out until after five weeks have elapsed and the child has been carefully disinfected.

ERYSIPELAS

This is an inflammation of the skin, and more rarely of the mucous membranes, produced by a special germ. Its popular names are "rose" and "St. Anthony's fire," the latter being derived from the belief, originating in France, that the relics of St. Anthony were particularly efficacious in its cure. It is very contagious, and severe epidemics of the disease were of common occurrence in the surgical wards of hospitals, the germs being transmitted from wound to wound by the air or by dirty instruments, but since the introduction of the antiseptic treatment of wounds the complaint has become much less frequent. Attacks originating in a wound are called surgical erysipelas, whilst those which affect the unbroken skin are distinguished as medical erysipelas; but its occurrence without some slight abrasion is very rare, and the two affections are exactly similar in all essential points.

Erysipelas affects women more often than men, is most common between the ages of thirty-five and fifty-five, and chooses the spring and autumn months for its appearance. One attack produces a strong predisposition to others, and some persons suffer from frequent recurrences. The disease was at one time produced intentionally by inoculation of the poison, in the hope of curing certain diseases, amongst them being sarcoma (a form of malignant growth), lupus, and chronic eczema. Considerable benefit occurred in most of the cases, although probably none were cured, but very severe illness was set up by this method, which is still employed occasionally in a modified form. As we have suggested, the slightest abrasion is sufficient to admit the poison, and it may find entrance even through the soreness produced by chronic eczema, a discharge from the ear, or a common cold. It shows a special predilection for the face and head, starting many a time from the skin-edges of the nose, mouth, or eyes, or from the orifice of the ear. The affected skin becomes red, hot, and swollen, and there is a smarting or burning pain. The inflammation has a peculiar tendency to spread widely from the place where it originates, the redness having a very distinct margin so long as it continues to advance. The part first affected recovers its normal condition, whilst the disease spreads farther afield.

Symptoms.

The incubation stage occupies from three to seven days, and the symptoms come on suddenly with the first appearance of the rash. They include fever, shivering, and even a rigor, headache, loss of appetite, vomiting, and a general feeling of severe illness. Their severity depends upon the extent of the inflammation, the virulence of the poison, and individual susceptibility. Sore throat and herpes on the lips are common, and the fever continues high so long as the eruption continues to spread. When it ceases to do so the temperature falls, and the disappearance of the fever is often accompanied by a free sweat. A peculiar variety of the affection is called "wandering erysipelas," in which the redness vanishes from one spot only to appear at another, and each fresh eruption is connected with a short period of fever.

In healthy people the complaint is mild and its symptoms slight, but in the delicate and unhealthy, in those who suffer from kidney disease or who are alcoholic, very serious illness may result, such as severe digestive disturbance, continuous vomiting and diarrhœa; or the nervous system may be deranged, and delirium, sleeplessness, and unconsciousness follow. When the eyelids and face are affected, the swelling is very marked, the eye cannot be opened, the lips are immensely swollen, and the features distorted and unrecognisable; if the throat is attacked, the swelling set up in the parts at the entrance to the windpipe causes great difficulty in breathing, and threatens to destroy life by suffocation. In some cases the poison spreads deeply in the skin, and the loose tissue underneath it becomes inflamed, matter is formed, and there are discharging wounds and much destruction of skin. Under such conditions blood poisoning may arise, and various inflammations are set up in distant parts, such as the membranes of the brain, the lungs, or the heart.

Treatment.

In undertaking the treatment of erysipelas it must be borne in mind that, though most cases are straightforward and recover in the course of ten days, others are complicated by dangerous and even fatal troubles. The disease being eminently contagious to those suffering from wounds, however small, the patient should at once be isolated to avoid risk. And those in charge must be careful to cover with an antiseptic dressing any cuts or sores from which they may be suffering.

The patient should be put to bed and his bowels well opened, and his diet should be light. If his strength begins to fail he must have stimulants, a couple of ounces of brandy a day with either soda water or egg flip. The iron and quinine tonic (Pr. 77) should be administered every three or four hours. Salicylate of soda, in 10-grain doses every four hours, is also recommended. The headache is relieved by the application to the head of an ice bag or by bathing it with iced water, and restlessness and delirium by sponging the body all over with warm water.

The disease has been treated by injections of a serum prepared from the germ, sometimes with good results, but at present the matter is in too undecided a state to warrant the general use of this method.

Local treatment has little effect upon the course of the disease, and the simplest measures are the best. The inflamed skin should be dusted over with a powder of boracic acid or oxide of zinc, and then covered with a thin layer of cotton wool. A soothing application for the face is lead and opium lotion, in which lint should be soaked and applied in the form of a mask, holes being cut for the eyes, nose, and mouth. If the mouth or throat is involved, lotions of boracic acid (a teaspoonful to a tumblerful of warm water) or Condy's fluid (of a faint purple) should be constantly used as a mouth wash and gargle; ice should be sucked, and a hot fomentation applied round the throat. Inhalations of steam are injurious.

CHAPTER XXIX

INFECTIOUS ERUPTIVE FEVERS

Chicken-pox—Measles—German Measles—Scarlet Fever.

CHICKEN-POX

CHICKEN-POX is so exceedingly common a complaint that few persons escape taking it during infancy or childhood. Some medical men have thought, although the belief is rapidly dying out, that there is no such distinct disorder as chicken-pox, but that all rashes which have passed under that name have really been forms of modified small-pox; and it is true that some cases of chicken-pox of an unusually severe kind have been mistaken for mild cases of modified small-pox, and vice versa. Besides certain differences in the look of the rash and in the course taken by each of these complaints, an important point to be borne in mind, as proving that they are really distinct diseases, is that an attack of chicken-pox will not prevent a person from taking small-pox, while it protects him, on the other hand, from having another attack of chicken-pox; and in the same way those who have recently had small-pox may take chicken-pox. The name of this disorder is probably derived from an allusion to *chick-pease* (French *chique*), suggested by the rash, and it appears to have been first described as early as the sixteenth century.

Chicken-pox occurs in epidemics in children's hospitals, and is especially to be found among the poor, where there are many children crowded together. It is communicated from the sick to the healthy by actual contact, or by a third person carrying the infection in the clothes, where it may sometimes remain for a long time without losing its poisonous properties. Children who are just convalescent are those who chiefly spread the complaint, since in mild cases they often get out and about again before the body is quite free from scabs, and these scabs, which form when the rash is dying off, are very infectious.

Transmission.

After exposure to infection nothing is noticed the matter with the child until from ten to sixteen days have elapsed, and the first thing usually to attract attention is the presence of a rash. The reason for this is that the feverishness with which this and all other infectious maladies commence lasts only a few hours, twenty-four at most, and mild cases with very little rash may be without any feverishness whatever. In cases of ordinary severity the fever may, however, reach as high as 104° when the rash begins to appear, and it continues until the rash has ceased to come out; but it is generally much less every morning and gets higher towards evening. The rash, which is very characteristic, comes out in crops, and consists of little water blisters, with a small, rose-coloured ring round them. They quickly enlarge to about the size of a split pea, and become glistening and opalescent, like glass or horn, and from this peculiarity the malady used to be known by the name of *glass-pox* and *horn-pox*. In some cases, where there is no red ring round the spots, the patient looks as if he were sprinkled with drops of clear water. The spots are seen on every part of the body, but are generally thickest on the back and chest. About four days later the spots begin to dry up and then form scabs, which fall off a few days afterwards, leaving in their place faint red marks. In some of the worst cases this is not so, but sores form which may take weeks to heal, and which leave scars not unlike those following small-pox. The spots come out in two or three crops, on succeeding days of the illness, but sometimes four or five crops come out. When the crops cease to appear, the feverishness comes to an end also, so that the complaint may be said to last, as a general rule, a little over a week, but in cases where there are more crops it of course lasts a little longer. The number of spots is very variable. We remember seeing a case in which there were only four spots altogether, but the patient's sisters took the complaint from her, and on each of them there were hundreds of spots.

Symptoms.

The Eruption.

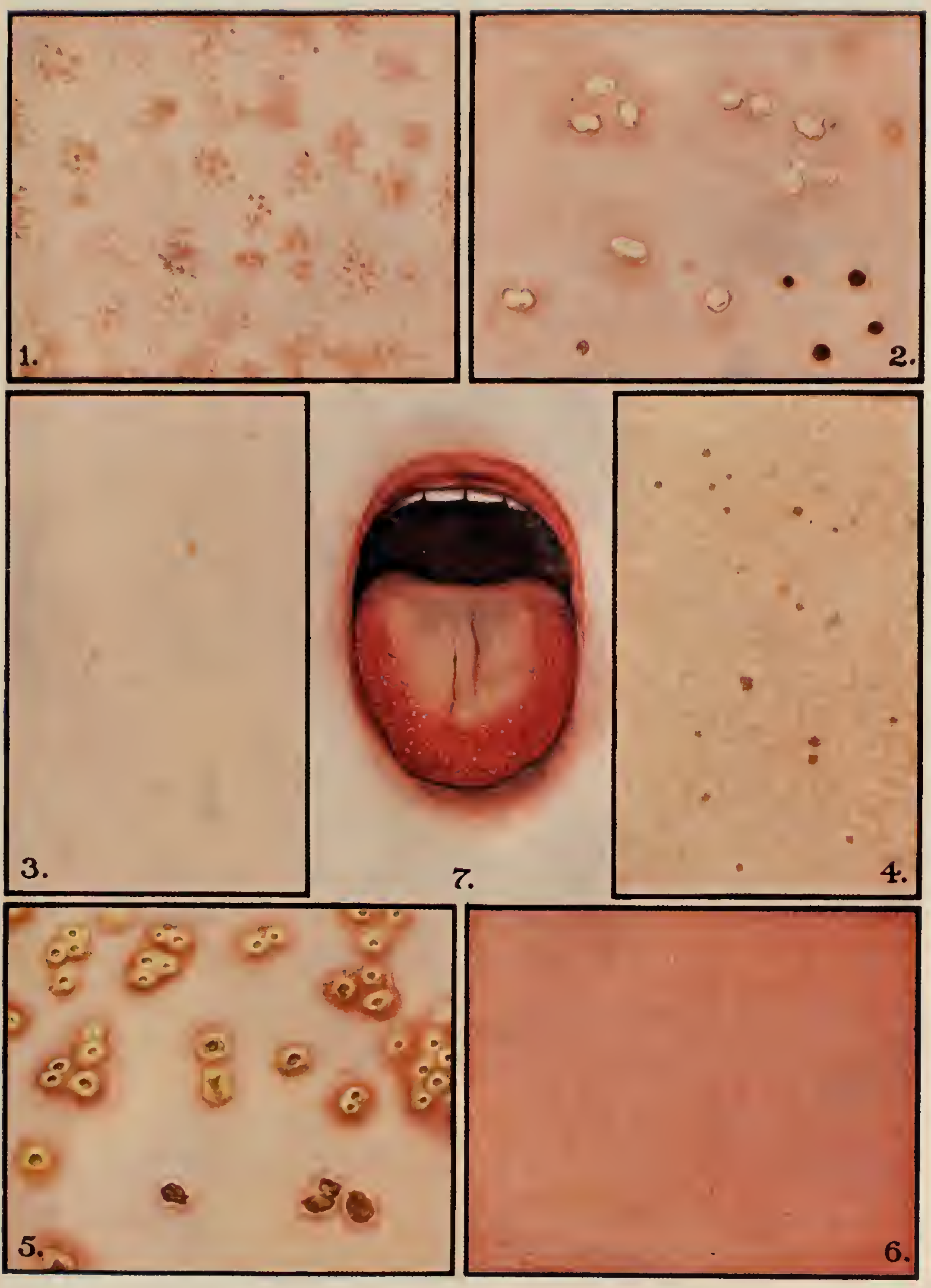
Throughout the course of the complaint the patient, as a rule, does not feel very ill, but when there is a good deal of feverishness there are headache and lassitude, a desire to keep in bed and to sleep during the day, while the nights are wakeful and restless. The tongue will be coated with a moist fur, and the appetite will be not so good as usual or lost entirely. Patients almost invariably recover from this complaint, but in weakly children or those with a tendency to consumption the spots may give rise to sore places or ulcers, which may join together and spread instead of healing, and this condition may increase the patient's weakness to such an extent that he may die.

Quarantine.

We have mentioned above that the little patient is not noticed to be ailing until some time after he has been exposed to infection, this interval, the period of incubation, lasting as a rule from ten to sixteen days. Accordingly a period of quarantine has been decided upon in order to prevent the spread of the complaint in schools, etc. No child who has not previously had the disease may return to school until twenty days have elapsed since the *latest* exposure to infection. After this period has passed it will be quite certain that he has escaped the infection. Another important point connected with infection is the question as to how soon after an attack a person may, with safety, mix with others. The answer is: not until every scab has fallen off, and the whole skin is quite clear of them.

Treatment.

In simple cases very little requires to be done. The patient should be kept in his room, and if there are many spots, or if he is very feverish, he should remain in bed. He must be isolated from other members of the household who have not already had the complaint. His food should be of a light kind, easy of digestion, such as beef tea or broth, milk, custard, and milky farinaceous puddings, arrowroot made with milk, blanc-mange, simple jellies, etc. There is no harm in a lightly boiled egg and a little thin bread and butter, if the patient can eat them, and tea may be allowed to older children who are in the habit of taking it. It is not necessary to withhold fluids, and the patient may be allowed to relieve his thirst freely with water or thin barley water. Some medicine which acts on the skin and encourages perspiration will make him feel more comfortable, such as half a teaspoonful, or a whole teaspoonful, of solution of acetate of ammonia, sometimes called Mindererus' spirit, in a wineglassful of water every three or four hours, the larger dose being for children over six years. Sometimes the rash is irritable, and it is very essential to prevent the child from scratching the spots, since if they are not protected from injury of this kind the resulting scars will be deeper. This is especially necessary, of course, on the faces and necks of little girls. In such cases the spots may be painted, night and morning, with a little carbolised vaseline, which, besides allaying irritation, has the merit of softening the scab and hastening the time when it should fall off. Or, if a greasy application be objected to, the following prescription will provide a lotion, to be



FEVER ERUPTIONS.

1, MEASLES. 2, CHICKEN-POX. 3, TYPHOID FEVER. 4, TYPHUS FEVER. 5, SMALL-POX. 6, SCARLET FEVER. 7. THE "STRAWBERRY TONGUE" OF SCARLET FEVER.

C

painted on the spots with a camel-hair brush; it will at once stop the itching.

PRESCRIPTION 148

Detergent solution of coal tar . .	½ drachm.
Prepared calamine	½ ounce.
Glycerine.	1 drachm.
Rose water to 1½ ounces.	

Make a lotion.

At the end of a week or ten days the child should have a warm bath every evening, and be very gently sponged with a little good soap. This hastens the falling-off of the remainder of the scabs and materially shortens the time when he may once more be allowed to mix with other children or return to school. When all the scabs have fallen off, his room may be changed, and the one he has been occupying should be disinfected.

MEASLES

Measles is an infectious disorder characterised by feverishness and the symptoms of an ordinary cough and cold, followed by a rash on the face and body. Many centuries ago measles was regarded as a minor form of small-pox, and the celebrated Arabian physician, Rhazes, was the first to distinguish these two diseases, about the year 850 A.D. Measles was also confounded with scarlatina until the seventeenth century, when the writings of the celebrated Sydenham led to their separation. The English word measles means spots or pimples; its Latin name, *morbilli,* means "little plague." This disease now exists nearly all over the world, in warm and temperate as well as in cold climates. In quite recent times, however, it was introduced into Iceland and the Fiji Islands, where it proved very severe and fatal to the inhabitants suffering from a disease planted, as it were, in a virgin soil. Although measles is a disease of children, and grown-up people do not often suffer from it because most of them have already had it, it may occur at any age, and unprotected adults take it readily and often severely. Second attacks are not uncommon, but some so-called second attacks are not so in reality, the first attack having been German measles.

Transmission.

Measles is due to a contagion or germ the nature of which has never been satisfactorily determined, but which is diffused in the air and clings to surfaces and clothes, and thus may be carried about by persons from place to place. Measles spreads very easily, because it is infectious in its early stages before the rash comes out, when it is often mistaken for a common cold. The poison is given off by the breath in coughing, and appears to be very diffusible. Measles occurs epidemically in large towns every eighteen months or two years, the epidemics differing extremely in their duration, extent, and fatality; but in large, populous centres sporadic cases are continually occurring. The mortality may be as low as 2 or 3 per cent., or as high as 50 per cent. In healthy persons of the well-to-do class the mortality is practically *nil,* while in the consumptive, badly nourished children found among the poorer classes it is very high. The great mortality from measles under such conditions is due to lung disease, not at the height of the fever, but during the second week, and is the result not so much of low temperature as of the impure and stagnant air in which so many of the poor keep themselves pent up for the sake of warmth. When measles supervenes on acute or prolonged illness it constitutes a serious additional danger. Infants are occasionally born covered with the rash of measles. The complaint is usually more severe in grown-up persons.

Quarantine.

The period of incubation is mostly ten to fourteen days, and the period of quarantine required by school authorities is twenty-one days after the latest exposure to infection. The period of infection ceases at the end of two weeks from the appearance of the rash, but it is well for the patient to keep his bed for ten days and his room for three weeks. He should not, however, return to school for at least a week longer.

Symptoms.

The early symptoms may begin suddenly with fever, aching pains in the limbs, headache and vomiting, but these may subside the next day, while those of a common cold develop. The patient sneezes, the eyes water and are seen to be red and congested, with swollen eyelids; there is a dry, hacking, and perhaps croupy cough; and sometimes the glands of the neck are enlarged. The throat may be seen to be red, and little opaque, white patches may make their appearance on the inside of the lips; earache also may be present. On the third day all these symptoms become more marked, and the fever increases, while the cough becomes more troublesome and the face blotchy.

The Eruption.

About the end of the fourth day the characteristic rash makes its appearance on the face and neck, and during the next two days spreads all over the body. On the face it has the appearance of dusky red blotches of irregular shape. When these are viewed closely a number of fine red points are seen, which have a rougl feeling when touched by the finger. On the chest and the rest of the body the rash is more "spotty." On the sixth day the eruption is at its height, and then begins to fade, first from the face and later from the limbs and body, and is followed by a slight scurfiness, especially on the face. On the seventh or eighth day most of the rash will have disappeared, leaving only a yellowish mottling or staining over the body.

Considerable irritation attends the rash, and sometimes a peculiar and offensive odour is recognisable. With the full coming out of the rash, the fever, which may show a temperature of 103° or 105°, quickly falls and becomes normal about two days later, the headache and discomfort disappear, the cough becomes loose and less painful, and the patient appears greatly relieved. Should the feverishness continue, it means that some complication, such as bronchitis or congestion of the lungs, is developing.

We have already hinted at the variable severity of measles in different epidemics and in different circumstances. Very often it happens that all the symptoms are milder than those just described. In one variety there is a rash, but the cold and cough are insignificant or absent; in another these symptoms are present, while the rash consists only of a few blotches of redness or an indefinite mottling on the neck, back of the hands, and thighs. Very severe forms, on the other hand, occur which are called "malignant measles," but at the present day they are very infrequent, and are found chiefly in young and sickly children. In these attacks there is high fever, a dry, brown tongue, deliriousness, and convulsions. The rash is very dusky or bluish black, due to bleeding under the skin. This form is known as "black measles." Death usually takes place within a few days.

Another severe variety of measles is that in which lung complications come on early, the temperature continues high, there is great difficulty of breathing, the patient becomes delirious and drowsy, the eyelids are glued together with mattery humour, the mouth and teeth are covered with a brown slime, and unless improvement takes place the patient sinks.

Other complications attending measles are inflammation of the windpipe, which is sometimes so severe and causes so much obstruction to the breathing that the operation of tracheotomy (p. 106) becomes necessary to save life. Inflammation of the eyes, or ophthalmia, occurs in anæmic and unhealthy children, and ulcers may form on the eye and may permanently damage the sight. The swelling of the glands of the neck may increase and form abscesses. The earache may turn to inflammation of the ear, the drum of which may become perforated, and a discharge of matter may continue for some time. Diarrhœa is not an uncommon complication, occurring most often, though by no means exclusively, during hot weather; it sometimes becomes so severe as to bring about a fatal issue, especially when the motions assume the character of dysentery, containing blood, slime, and hard lumps, with protrusion of the bowel.

Sequelæ.

After an attack of measles the patient often remains for many months in a state of ill-health, is especially prone to develop consumption, and is very apt to be seized with bronchitis or even pneumonia, especially in the cold seasons of the year. Whooping-cough also often follows measles.

Diagnosis.

The disease most likely to be mistaken for measles is German measles, the latter disorder closely resembling mild measles. It is possible also to confound measles with small-pox, but this difficulty is more likely to arise in adults than in children, the rash of small-pox being harder and having a more " shotty " feel than that of measles. Scarlet fever begins much more suddenly than measles, there is more marked sore throat, the rash comes out very early and is scarlet and uniform, not dusky red and blotchy.

Treatment.

In an attack of ordinary severity no very active treatment is required beyond rest, pure air, equable warmth, diluents and nourishment, but much may be done to promote the patient's comfort and prevent the occurrence of complications. As soon as the symptoms of catarrh above described give rise to a suspicion that they may be caused by measles, the patient must be confined to his room and if feverish sent to bed. The temperature of the room should be maintained at 65° F., and if the cough is hard and troublesome the atmosphere should be kept moist by means of a steam kettle. Good ventilation must be secured which admits fresh air without draught or chill to the patient, while a spray of ozonised water or aromatic vinegar may be used to freshen the room, which should be kept quiet and at times dark, so that sleep may be favoured.

Diet.

The diet should consist of milk, broth, or meat jelly, while in mild cases custard, lightly boiled eggs, farinaceous puddings, and bread and butter may be allowed. Extra liquids, such as barley water, lemonade, black currant or tamarind drinks, cold water, and small pieces of ice, are grateful to the patient and useful in allaying the irritating cough. Sponging with warm water part of the body at a time, with a little Sanitas added, relieves the feeling of heat and itching and helps to bring out the rash. The free use of cold, so potent a means of reducing feverishness in scarlatina and other fevers, is not advisable in the early stages of measles, and would be injurious until after the eruption is out. Irritation of the face may be soothed by the application of cold cream. The bedclothes should not be too heavy. Where there is much fever, restlessness, and cough, solution of acetate of ammonium may be given, in doses of half to two teaspoonfuls, according to age, in a wineglassful of water, every three or four hours; to each dose a few drops of ipecacuanha wine may be added. No medicine seems to have much influence over the cough until after the eruption, but small doses (3 grains) of Dover's powder may be tried—not, however, in the case of children without medical advice, as they are very susceptible to the opium contained in this time-honoured preparation. The bowels should be gently regulated, but no diminution of the fever must be expected from strong purgative medicines, nor is a furred tongue any indication for their use; and, considering the frequency of diarrhœa as a complication, it is wiser to withhold them altogether.

In cases of greater severity active treatment may be required, especially when the patient is a child, with a scanty rash, high fever, and signs of bronchitis or congestion of the lungs. It is extremely important in this event to procure efficient action of the skin, and thereby relieve the congested internal organs by means of tepid sponging, hot packs, and mustard baths. For a child under two years of age the mustard bath is the most satisfactory method. Prepare a bath of hot water, at a temperature of 100° F., adding one tablespoonful of mustard to each gallon of water, and put the child in it for three minutes; then dry him quickly, and place him between blankets. If necessary, the bath may be repeated in two hours. These baths exercise a stimulating action on the skin, and prove very beneficial. Unless the services of a trained nurse are obtainable, linseed poultices on the chests of young children should be avoided, as in unskilled hands they are too heavy and oppress the breathing; hot fomentations and bran poultices are preferable. Alcohol, in the form of brandy, whisky, or wine, must be given if the pulse is weak and rapid or if the tongue is dry and brown. There is, perhaps, no condition in which the administration of stimulants produces such marked and immediate benefit as in congestion of the lungs at the crisis of an attack of measles, and it is sometimes the means of saving life in the after depression until sufficient nourishment can be taken to give the requisite support to the patient. In older children small doses of tartar-emetic, $\frac{1}{100}$ to $\frac{1}{40}$ grain, may be given in a teaspoonful of solution of citrate of ammonia every three or four hours, provided it does not produce nausea.

After the crisis, tepid bathing is a useful means of aiding sleep and giving tone to the circulation. If head symptoms threaten, an ice-bag may be applied to the head. In severe cases the eyes, nose, and mouth require attention; they should be bathed or mopped out with warm water. If ophthalmia supervenes, lead lotion is necessary, and the swollen eyelids should always be raised to see that no injury to the eye occurs while most of the attention is being directed to the severer symptoms. Ulcers in the mouth should be touched with glycerine of borax or solution of boric acid. Earache may be relieved by a warm poultice, with a little laudanum in the ear, and if there is any discharge, by syringing with tepid water containing a little Listerine.

During convalescence, after-treatment is always important and necessary. A tonic mixture of dilute nitric acid (5 drops), compound tincture of bark (20 drops), and chloroform water (a tablespoonful), may be taken after meals two or three times a day. In strumous and delicate children cod-liver oil or Scott's emulsion, given an hour after meals at least twice a day, should be persevered with for some time, and the clothing should be warm, with flannel next the skin. Cold baths, with sea-salt in them, rapidly performed, are to be recommended. When the weather is fine the convalescent should go out of doors once or twice daily after three weeks have elapsed, taking special care to avoid fatigue and chill.

At the conclusion of the illness the sick-room occupied by the patient must be purified and disinfected by burning in it sulphur or formalin before the cleaning, the bedding must be removed and stoved, together with all clothes used during the illness. Until a much later stage, change of air is not so necessary as is often supposed; the dangers of convalescence and the possible development of any constitutional defect are best guarded against at home. Adults should avoid hard work or exposure to night air for one or two months after an attack of measles.

GERMAN MEASLES

German measles is a disease of protean aspect and variable nomenclature. It has a strong resemblance sometimes to measles, at other times to mild scarlet fever, and it is known also by the names of false measles, epidemic roseola, rubella, and *Rötheln* (the German name). It is a specific infectious fever, closely resembling but distinct from measles, from which it gives no immunity. In some epidemics, again, it closely resembles mild scarlatina. Its most essential features are that, with a rash more like that of measles, it resembles scarlet fever in the eruption coming out on the first or second day of the illness, and in being attended with sore throat.

Diagnosis.

German measles was distinguished from measles and from scarlet fever by physicians in Germany in the latter half of the eighteenth century, and they bestowed on it the name *Rötheln.* It was not described as a distinct disease in this country until 1840. A favourite idea with old writers was that it was a "hybrid" between these two diseases. They even spoke of the symptoms as alternating, so that at one time there would be the rash of measles with the symptoms of scarlet fever, and at another time the symptoms of measles with the rash of scarlet fever. Whatever may be said of the possibility of the two diseases combining so as to produce a modified affection in a single patient, German measles is not now believed to be a hybrid disease, for it is difficult to imagine that such an affection would be epidemic, and still more so that its contagion should prove protective against a recurrence of itself, while affording no protection against the constituent diseases.

There is nothing, however, intrinsically impossible in the idea that the resemblance may be something more than mere coincidence, and that the specific germ or poison of each disease may originally have been derived from one of the others, or from a stock common to all three, and that it has become gradually modified by being cultivated under varying conditions. In this respect it is interesting to note the assertion of some observers that the character of an epidemic of German measles becomes changed according to the prevalence of measles or scarlet fever, when either of those complaints happens to be about at the same time. And there is a further curious fact that some epidemics of German measles do occur in which the rash closely resembles that of scarlet fever, and not that of measles, as is usually the case. It is not possible to say, however, whether these two forms are only varieties of the same disease, or two distinct diseases as some assert, or whether a "fourth disease," distinct from each of the other three, really exists. Neither can we tell whether the measles variety protects from the scarlatinal variety.

In this connection we may say that, during epidemics of measles or of scarlet fever, mild and irregular cases of both are frequently confused and mistaken for German measles, while well-marked outbreaks are sometimes called ordinary measles, and slight attacks of scarlet fever may be miscalled German measles. On the other hand, there is very good evidence afforded by those who have had the opportunity of watching successive epidemics of infectious diseases in schools and asylums, where the same individuals have been attacked, that German measles does not protect from either measles or scarlet fever, and that attacks of these latter do not confer any protection against attacks of German measles.

German measles occurs in epidemics, or in isolated cases which show little tendency to spread; it has therefore on the one hand been regarded as extremely contagious, and on the other hand some have maintained that its contagiousness is almost *nil*. It is probably most frequent about puberty. Younger children seem less susceptible, and in some epidemics adults suffer more in proportion to their numbers. Sex makes little difference, although some have stated that the boys in a family escape oftener than the girls. Probably the susceptibility to its influence varies at different times and under different conditions in a manner difficult to account for, hence the discrepancies in the descriptions given by different authorities. All agree, however, that it is propagated by contagion from other cases.

Incubation and Quarantine.

The period of incubation is somewhat uncertain; it is usually long, mostly over a fortnight. The code of rules issued by the Medical Officers of Schools Association gives the extremes as "seven to eighteen days, or even longer." The infection appears to be less active than that of measles and less persistent than that of scarlet fever, for during an epidemic more escape in a house or school than is the case with measles, and after an interval of cessation fresh cases seldom occur. Nothing is accurately known of the mode of conveyance of the contagion, but it is safest to assume that it is contagious even before the rash comes out, and that it continues to be so for some days or even weeks afterwards. Hence the patient should be isolated for at least three weeks, and it is wiser to allow four weeks to elapse before he is allowed to rejoin his companions. The code of rules above referred to gives twenty days as the period of quarantine required after the latest exposure to infection, and states that the period of infection ceases in "not less than ten days" after the appearance of the rash.

As a rule, the symptoms which precede the eruption are very indefinite; weariness, fulness in the head, aching pains in the back and limbs, chilliness, and slight sore throat may be complained of. In children the rash is usually the first thing to be noticed, being first seen with surprise in dressing. An important and early sign, especially in children, is enlargement of the glands of the neck, which may be also tender, and give rise to a certain amount of stiff-neck. There is little or no catarrh, but the eyes may be suffused and the eyelids swollen and irritable. The throat is red, the tonsils are full and smooth, but there is never any ulceration.

Symptoms.

The rash, which comes out on the first or second day, usually consists of patches of a rose-red colour which shade away into the colour of the skin. They are not grouped into crescent-shaped forms, as in measles, so that the eruption appears less mottled, more diffuse, and brighter in colour than in the latter disease. The patches often join together, but do not produce the fine, uniform redness seen in scarlet fever. The rash comes out first on the face, and is usually abundant on the neck, chest, and back, on the front of the arms and the back of the thighs. It is generally most intense on the second day, but by the third or fourth day it has mostly faded. In fact, it often begins to fade on the face and chest while it is still coming out on the legs and arms. When it fades it leaves no discoloured mottling, but sometimes there is a slight yellowish staining and a light, bran-like scurfiness. In some cases there is no feverishness throughout the attack, and when it exists the fever is not very high, and the temperature falls to normal as the rash disappears.

The Eruption.

We have already stated that in some epidemics of German measles the rash, instead of resembling more or less that of ordinary measles, is more like that of scarlet fever: this constitutes the so-called scarlatinal variety. The patient has a uniform red rash, which is copious, and cannot be distinguished from a scarlet fever rash, except that it is of a more rosy tint. That such cases are distinct from scarlet fever is proved by the fact that a number of them, admitted as such into a fever ward, develop scarlet fever a few days after their admission. The fever, the amount of illness, and the sore throat are slight, while the rash is copious; whereas in scarlet fever, with an abundant rash, the fever is usually high, the tonsils are angry-looking and swollen, and the patient is evidently ill.

German measles must not be mistaken for the rose-coloured, patchy rashes which occur from eating indigestible or improper food, nor for those due to irritation of the skin caused by flannel underclothing during hot weather. In these there is neither sore throat nor fever. It is well to remember also that a red rash may be due to belladonna, when taken internally, either accidentally or as a medicine.

There are usually no complications or after-effects in cases of German measles, and the disease is probably never fatal in healthy persons, although a certain amount of weakness and ill-health may occasionally follow. When serious after-effects do occur, it is probable that a mistake in diagnosis has happened, and that the attack has really been one of mild scarlet fever.

Treatment.

As regards treatment, every case of German measles, even when merely suspected, should be isolated and the patient confined to his room, if not to bed. The diet should be of the same kind as that advised in the other infectious fevers, such as measles (p. 124) or chicken-pox (p. 120), and the medicine as prescribed for the latter. Other symptoms will call for special treatment, should they arise. The usual means of disinfection, both of the room and its contents, must not be neglected. During convalescence, a teaspoonful of steel wine with water should be given twice daily.

SCARLET FEVER

This disorder, although known for centuries, was constantly confused with other diseases, especially measles and erysipelas, until it was carefully observed and described by Sydenham in the latter half of the seventeenth century. He named it scarlet fever from the appearance of the rash; it is also called scarlatina, a term used popularly to denote a mild attack, but this distinction is not usual with medical men. It occurs in the form of epidemics, and in all parts of the world; it is most prevalent in North-western Europe and North America, and is much rarer in Asia and Africa. The greatest number of cases occur in September, October, and November.

It is chiefly a disease of childhood, a large proportion of all cases occurring in children under ten years of age. Infants under six months are rarely attacked, children from four to seven very often. Adults are not exempt from it. There seems to be a special susceptibility to it in some families, and instances are known of several members in one family falling victims to its attack, while in other families there is known to be an inherited immunity. Some at present unknown conditions predispose to attack, but these do not seem to be dependent upon ill-health, for the strong and healthy are as prone to take it as the weak and delicate. Those who have been recently under operation, or who have open wounds, show a decided predisposition, and at one time these cases, which were called surgical scarlet fever, were looked upon as a distinct class; but there is no reason for this distinction, as the disease follows a course exactly similar to that of the complaint in general. The individual susceptibility varies in a way which cannot be explained, for many doctors and nurses, who have spent many hours in the scarlet-fever wards without being infected, have been known to take the disorder from a passing exposure at another time.

Though scarlet fever is highly infectious, more persons escape its infection than that of measles. The infection is always derived from

Infection.

a previous case, and is spread in many ways. It may be transmitted directly by the breath of the patient, or by discharges from his body, from his mouth, throat, nose, or ear. It may be disseminated by the scales which separate from his skin in the process of peeling, and may be conveyed in any articles that have been in the sick room—cups, spoons and forks, books, letters and toys, clothes, bedding, and furniture. All such things are capable of harbouring the poison, and of retaining it in a state of activity for many months if excluded from those active purifiers, daylight and fresh air. The disease is probably not infectious until the eruption has shown itself, and its spread can therefore be greatly controlled.

Some severe epidemics have been traced to the milk supply, this fluid having been contaminated, either by a person suffering from the disease or because it has been drawn from diseased cows. If any suspicion should be felt regarding the milk, complete security may be attained by boiling it before use. Defective drainage is considered to have originated some outbreaks.

One attack of the fever affords protection which usually lasts a lifetime, though second and even third attacks are not unknown.

The incubation period is from one to eight days, usually three to five. The symptoms appear in most cases quite suddenly. A person

Symptoms.

in perfect health is attacked with sore throat, headache, vomiting, and occasionally diarrhœa. He also shows the various symptoms of fever—chilliness, aching pains, furred tongue, hot, dry skin, and raised temperature. The more severe the onset the worse the attack is likely to be. Within twenty-four hours of the first symptoms the eruption shows itself. It first appears on the chest, neck, and arms, and rapidly spreads over the whole body during the next twenty-four hours. The rash consists of minute red spots, which rapidly unite and form a general bright scarlet blush, that disappears on pressure. It fades away in the same order that it develops, leaving the neck and chest first, and by the end of a week has usually quite gone.

With the eruption there is often a good deal of swelling of the skin, and sometimes there are crops of blisters surrounded by rings of red. As the redness subsides the skin of the part "peels," the "peeling" commencing on the parts first attacked by the rash. Where the skin is delicate it forms a fine, powdery scurf, as on the face and under parts of the arms; on the chest and abdomen it forms distinct scales, and on the palms and soles large flakes. In four weeks the peeling is completed on the body generally, but takes two or three weeks longer on the palms and soles.

The "Strawberry Tongue."

The condition of the tongue is very characteristic. It is red and raw-looking at its tip and edges, and dirty, with a thick coating of fur along its centre; through this white fur little red spots show themselves. At the end of three or four days the fur has disappeared, the back of it clearing last, and the tongue is left with the red, raw, and rough appearance of a ripe strawberry. Such a "strawberry tongue" occurring with sore throat is almost sufficient to prove the case to be one of scarlet fever. The throat is always affected, but to a varying extent. The tonsils, uvula, and neighbouring parts become red, swollen, painful and covered with a discharge that may consist of thick mucus, or may form patches on the tonsils or even a distinct membrane, and the inflammation may spread up into the nose, and is particularly troublesome in children who have adenoids. The glands below the jaw are enlarged and tender, cause much pain in swallowing, and may ultimately form matter and give rise to troublesome abscesses. The temperature rises suddenly with the onset of the disease to perhaps 102°, and on the third or fourth day, when the rash is fully out, to even 104°. It then begins to abate, and disappears with the eruption. The pulse and respiration are quickened to a degree corresponding with the fever, but are particularly rapid in the early stage. As might be expected with so severe a disease, the nervous system is much affected. A convulsion is one of the early symptoms in young children, and delirium is common at night at the height of the illness.

This description represents an ordinary attack, without any symptom of particular severity, but many exceptions occur. There may be symptoms of such slight importance that the illness might almost pass unnoticed. A red blush shows in various parts of the body, with or without a mild sore throat, and accompanied with slight feverishness. The child seems hardly out of health, and yet the eruption is followed by peeling, and others may be infected and suffer from a severe form of the disorder. These cases are difficult to recognise, and are of great danger to the community, for they may spread the infection far and wide.

Slight Attacks.

Other cases form an absolute contrast to these, and are termed "malignant" scarlet fever. They come on with great suddenness and severity. The vomiting is excessive and persistent, the temperature rises very high, perhaps to 106°; the eruption is very widespread and well marked, and often contains blood spots; and the pulse is very rapid, even 180 in children. Death may occur on the fifth or sixth day, with delirium, passing into coma. In such attacks it is believed that a very large dose of the poison has found entrance into the body.

Malignant Attacks.

A third class of cases is marked by very severe throat symptoms, in which the tonsils become deeply ulcerated and covered with a membrane much like that of diphtheria. The glands of the neck are greatly swollen, and may break down into abscesses. A state of blood-poisoning is developed, which may end fatally with diarrhœa, excessive sweating, and inflammation of the lungs.

Throaty Cases.

Fortunately, such cases are quite exceptional, but even in ordinary cases there are complications against which it is necessary to be prepared. The most frequent is ear disease, set up by a spread of inflammation from the throat along the Eustachian tubes. It is most likely to occur in severe cases, at the end of the first week, and in young children; it takes the form of inflammation of the middle ear (pp. 71, 72). It is a serious trouble, often causing permanent deafness, and through the severity of the general symptoms it is very liable to be overlooked.

Complications.

Another grave complication, which may follow a mild case as well as a severe one, is inflammation of the kidneys, with the passage of a large amount of albumen in the urine. It appears most frequently in the second or third week of the illness, when everything seems to be progressing favourably, and is probably set up by exposure to cold. It is one of the dangers which have to be particularly guarded against, and for this reason the urine should be carefully examined twice a week to discover if albumen is present. At the height of the fever it is not uncommon to find a slight cloudiness of the urine when it is boiled, but it rapidly disappears as the fever subsides, and this condition need not cause alarm. But if the amount of albumen should increase, as is shown by the cloud becoming denser and by a greater deposit of albumen forming when the boiled urine is allowed to stand, its presence is of much greater importance, especially if the urine shows traces of blood by becoming thick and " smoky " looking. The symptoms of kidney trouble set in suddenly : the urine, smoky-looking and containing albumen, is passed in very much smaller amount; the eyes grow puffy, the feet swollen, and in bad cases there may be persistent vomiting, headache, drowsiness, a return of fever, and even convulsions.

The great majority of these cases get quite well, and the albumen disappears from the urine in the course of a few weeks, but the most careful management is requisite, and the illness is much prolonged. Some cases drift on into chronic Bright's disease.

Rheumatism is another common complication of scarlet fever, chiefly met with in adults and in those who have previously shown rheumatic tendencies.

Treatment.

Scarlet fever is a dangerous illness, and the ultimate issue of an attack depends greatly upon the care exercised in its management and the skill shown in its nursing. In young children and infants, especially those with tubercular tendencies, it often proves fatal by the virulence of its attack, whilst in older patients the chief danger to be apprehended is from its complications, most of which can be averted by careful treatment. Epidemics vary much in their severity, some consisting of mild, others of very severe cases; but, apart from this, individual attacks differ much in this respect. In some the dose of poison seems overpowering; the onset is alarming; convulsions and delirium occur early, and the temperature may rise to 106° or 107°. Again, danger may be anticipated when bleeding occurs, from the nose or kidneys or into the skin; if into the skin an eruption of blood spots is formed. Another symptom of danger is extreme swelling of the throat with excessive formation of membrane on it, and swelling of the glands in the neck.

No drugs cut short the disease or control its course. The patient must be at once put to bed in the room best suited for isolation, and in charge of a skilful nurse or nurses. Thorough ventilation and adequate warmth (about 60°) should be provided; a fire should be lighted, and the window kept slightly open day and night, draught being prevented by the use of a screen; the bed clothes should be light but warm. Woollen night clothes should be worn.

Diet.

The food during the feverish stage should consist of milk, broths, beaten-up eggs, calf's-foot jelly, and light milk foods. Ripe, fresh fruit may be allowed, and water as freely as the patient desires. As the fever disappears, the diet may be increased to bread and milk, milk puddings, custard, lightly boiled eggs, and bread-and-butter, and ordinary fare may be gradually returned to during convalescence.

Much comfort is obtained by sponging the body all over with warm water, and this should be done every evening, with due care against chills; it soothes the skin and promotes sleep. After the temperature has reached the normal a daily warm bath should replace the sponging. The bowels must be regulated by simple aperients, compound liquorice powder for adults and syrup of senna or figs for children. The confinement to bed need not last longer than from ten days to a fortnight, if all has gone well, but it is usually wise to keep young children in bed somewhat longer; and the confinement to the sick room should be continued until peeling has ceased. The patient should be dressed warmly and still avoid chills, for the inflammation of the kidneys is particularly liable to come on in the second or third week, and the urine should still be tested for albumen every few days. The various organs should be kept in action by a simple fever mixture, such as this:—

PRESCRIPTION 149

Solution of acetate of ammonia .	1 ounce.
Bitartrate of potash	3 drachms.
Sweet spirits of nitre . . .	½ ounce.
Tincture of lemon	2 drachms.
Syrup	3 drachms.
Water to 8 ounces.	

A dose to be taken every 3 or 4 hours.

Dose: One teaspoonful for an infant, a dessertspoonful for a child of five, a tablespoonful for a child of twelve, one eighth part for an adult.

When the skin begins to peel it must be treated with some antiseptic grease to prevent the scales from flying about. Either carbolic oil, 1 in 30; carbolic vaseline; eucalyptus ointment; or olive oil, 8 ounces with 1 drachm of carbolic acid and 2 drachms of eucalyptus oil, may be applied daily after the washing. The throat should receive special attention, and must be treated with antiseptics, applied as gargles, lozenges, lotions on wool, or with a syringe. A first-rate disinfectant is a "free chlorine gargle," which can be obtained from the chemist; others are Condy's fluid with warm water, of a pale purple colour; and boric acid, one teaspoonful to half a pint of water. These are best applied to the throat with a ball syringe, and to the nose, diluted with an equal quantity of warm water, with a nasal douche (*see* Vol. I., p. 231). Formamint tablets purify the throat, and sucking ice relieves pain.

If the glands are swollen, linseed poultices and fomentations should be applied. For excessive fever, cold should be employed as recommended for hyperpyrexia (p. 90); and for earache and inflammation of the middle ear, the measure advised for those troubles (pp. 71 and 75).

If albumen appears in the urine in large quantities, especially in the later stages of the complaint, the patient should at once return to bed; he should wear a flannel nightdress, and lie between blankets, the sheets being removed. A good purge should be taken, either a teaspoonful of Epsom salts, or 30 grains of compound jalap powder for an adult, which should be repeated, so as to keep the bowels loose. A hot poultice to the loins; a hot-air bath, if that can be managed; and a mixture to act upon the skin (Pr. 59), should all be employed. Large enemata in the bowel are sometimes useful. The food must be fluid—milk with soda or barley water, or peptonised milk, and it should be taken in small quantities frequently. Solid food should only be returned to very gradually as the urine is passed in increased amount and the albumen disappears from it.

During convalescence 5- to 10-drop doses of the tincture of steel, according to age, should be given, with a tablespoonful of chloroform water, three times a day after food, and great care must be exercised to dress warmly and avoid exposure to cold.

The ordinary measures of disinfection must be carried out before the patient associates with others, which must never be allowed until at least six weeks from the first symptoms, and not even then unless peeling has ceased and all sore throat and albumen have disappeared. The length of time that infection continues is very uncertain, and many do not consider that peeling in the late stages (that is, after six weeks' isolation) proves the presence of infective particles.

Quarantine.

The period of quarantine required, from the latest exposure to infection, is two weeks, after which all danger of an attack is at an end.

CHAPTER XXX

INFECTIOUS ERUPTIVE FEVERS (*concluded*)

Small-pox—Typhoid Fever—Typhus Fever.

SMALL-POX

Is an acute infectious disorder which was first described by the Arabian physician Rhazes about A.D. 900, and appeared in Europe during the sixth century, having been probably imported from the East, but its exact origin is not known. The scientific name for small-pox is *variola*. It attacks people of both sexes and of all races, in all climates, and at every age, being severe among inhabitants of warm countries and those who are unprotected by vaccination. One attack protects against a second, and vaccination has a similar effect, that is, if it does not procure complete immunity, it almost invariably renders an attack extremely mild and without danger.

Small-pox is caused by a poison, although as yet no special microbe has been distinctly defined in connection with it. This poison has an incubation stage of twelve to fourteen days, during which it produces no symptoms, and at the end of this period the attack commences with a sudden shivering fit, headache, backache, and feverishness; sometimes there is vomiting and profuse perspiration, and sometimes there is a faint rose coloured rash more or less all over the body. On the third or fourth day the "spots" appear, and are accompanied by a decrease of the fever, which continues till the eighth day. The spots come out first on the forehead and wrists, like smooth, round, hard, red pimples, and after two days a small blister forms on each, and they gradually increase in size, the tops becoming flattened or hollowed out; about this time they continue to come out on the chest, back, and limbs.

Symptoms.

The Eruption.

The eruption is fully out by the eighth day, and some of the spots now fill with yellowish matter and become larger and rounder, and at the same time the temperature, which had fallen a little, again rises, and the patient feels more ill. In mild cases, called *discrete,* each spot or " pock " remains distinctly separated from the others, and dries up rapidly or bursts, leaving a scab; the temperature reaches normal by about the tenth day, and the patient soon becomes convalescent, though the scabs take some time longer before they fall off. Spots also may be seen on the inside of the mouth and in the throat.

Besides the *discrete* form, there is another mild variety called *modified* small-pox or *varioloid,* which occurs in persons who have been previously vaccinated. In these cases, after three days of feverishness, a few pimples come out which rapidly dry up and disappear, or the pimples turn into blisters but dry up without becoming mattery, and without any more feverishness. It must not be forgotten, however, that in some cases of modified small-pox the feverishness and illness before the spots come out may be as severe as in ordinary small-pox, and it is only by the spots not " coming to a head," as it were, that the character of the attack can be decided.

Although the above varieties are, as a rule, comparatively mild, there are severe forms which are extremely fatal. One of these is *confluent* small-pox, of which about half the cases die. In this form the fever at the commencement is more severe, the spots, which may be separate at first, soon run together, and the whole face becomes greatly swollen, with a whitish-yellow colour that makes it look like a mask of parchment. The swelling increases until about the ninth day, when the features are so changed that the patient cannot be recognised, the eyelids cannot be opened, and the ears and sides of the neck become bloated. The hands and feet in the same way become painful and swollen, there is sore throat, and dribbling of saliva from the mouth, sleeplessness, and often delirium. The fever which, as in the discrete variety, falls somewhat on the appearance of the eruption but not nearly to the same extent, rises again until about the twelfth day. By this time the spots will have burst and discharged their contents, saturating the pillow and sheets, and crusts will form, and by the fourteenth day the temperature will have become normal, the symptoms of illness have disappeared, and the patient become convalescent. The crusts remain for many weeks, and when they fall leave scales, then scars, which at first are reddish brown and after some time become white. If the case is about to end fatally, towards the eleventh day low delirium sets in, the motions are passed unconsciously, and sometimes bleeding into the skin and into the spots takes place.

Another severe form of the disease is *malignant* or *black* small-pox, which is invariably fatal. The patient is from the first very ill, and on the third day bleeding takes place into the skin, forming black spots, patches, and lumps, the usual eruption being almost entirely absent or consisting merely of a few small, scattered pimples, generally on the fingers and toes. Bleeding also takes place in the eyes, and from the throat, nose, and gums, and the urine and motions may contain blood. Death usually takes place about the fifth day; consciousness is generally retained even to the end.

Complications.

The most frequent complications of small-pox are inflammation of the windpipe, bronchial tubes, and lungs; ulcers on the eyes are not uncommon, resulting in loss of sight, and abscesses and erysipelas also may occur.

In children under fifteen who have three to four vaccination marks the disease invariably runs a mild course. After this age, however, vaccination somewhat loses its efficacy, though it almost always modifies the disease, death only occurring as the result of some complication.

Diagnosis.

The question whether certain attacks are or are not small-pox cannot be definitely settled until after the appearance of the eruption; this disease should be suspected, however, if during an epidemic of small-pox a case of feverishness should occur with severe backache and vomiting. The eruption of glanders may be mistaken for that of small-pox, and so may some skin diseases, such as syphilis, acne, and nettle rash; but the history of such cases is entirely different, and a correct decision is arrived at by asking the question: If the disease *were* small-pox, would it be exactly in this stage of the eruption, considering the time the patient has been ill? (*See* p. 91.) The greatest difficulty arises in distinguishing between modified small-pox and chicken-pox (p. 118).

Treatment.

There is no remedy known that will cut short the disease, and it is doubtful whether vaccination performed early in the incubation stage has any effect in modifying the course of the attack. Attention, however, must be directed to general principles of treatment and to the symptoms and complications. The patient must be isolated in a large, well-ventilated room, and fed at regular intervals with easily digested liquid nourishment, such as beef tea, broth, milk, and eggs. He may be allowed to assuage thirst with water or bland drinks. The bed and clothing should be light and soft. Lanoline or vaseline may be applied to the skin to relieve itching and help to loosen scabs, and cold compresses to the swollen eyelids, and it is better to cut the hair short. The bedding should be sprayed with some deodorant, such as ozonised water, to minimise the disagreeable odour proceeding from the patient. The mouth should be kept clean and the eyes carefully watched. For sleeplessness some form of alcohol may be given in hot water at night, and stimulants are generally needed when there is much mattery discharge. Delirium calls for extra nursing, and inflammation of the windpipe or larynx must be carefully watched for, lest necessity should arise for the operation of tracheotomy to prevent suffocation. Attempts have been made to treat cases of small-pox in dark rooms to the exclusion of blue light, or in rooms in which only red light is admitted, with the view of preventing the pimples from coming to a head; but no marked success has hitherto attended this plan. The patient must not be considered free from infection until all the scabs are removed from the body. After this, six baths should be given, one every other day.

The period of quarantine required after the latest exposure to infection is sixteen days.

TYPHOID FEVER

This fever is frequently known also by the name of enteric fever, which was given to it by those who regarded the appellation " typhoid " as unfortunate in that it seems to indicate a resemblance between this complaint and typhus instead of a difference, and in that the word has also been used to describe a collection of symptoms that includes a dry, brown tongue and muttering delirium, which are characteristically seen in typhus fever. When occurring in children, it has often been spoken of as gastric fever and infantile remittent fever, but since the discovery and identification of the typhoid bacillus there is no use in retaining these names.

The disease may be briefly defined as a fever of long duration, due to a peculiar and special germ, usually accompanied by diarrhœa, and having an eruption of small, rose coloured spots. Until the early part of last century, typhoid fever was not distinguished from typhus, but the discoveries by Broussais and Bretonneau of a peculiar form of ulceration in the intestines of patients dying of typhoid fever eventually led to their ultimate separation. The matter was definitely settled by the researches of the late Sir William Jenner, who proved that typhus and abdominal typhus, as they were then called, owe their origin to distinct causes. It was

Typhoid and Typhus.

formerly thought that the poison of typhoid fever could be generated in decomposing sewage and other forms of animal refuse, but it is now known to be specific in its nature, derived only from pre-existing cases of the disease, and to consist of a special germ or microbe. This germ is known as the typhoid bacillus, and was discovered by Eberth in 1880, and studied with great accuracy and cultivated by Gaffky in 1884. The typhoid bacillus is found associated with the ulcers in the intestines in the early stages of the disease, and possesses two interesting and peculiar features: in the first place, it is endowed with the power of motion when examined in fluids; secondly, each bacillus has a large number of irregularly arranged, lash-like processes called *cilia,* running out in all directions from its sides. Experiments made with regard to the growth of this bacillus show that it can remain alive for an appreciable period in water, and so it is probable that in sewage water it can live and even multiply for a considerable time, thus leading a separate existence outside the body, and contaminating the soil manured with the sewage and the vegetation grown upon the soil.

Cause of Typhoid.

The typhoid bacillus has of late years attained a practical importance as furnishing a very reliable means of diagnosis between this disease and others to which typhoid bears some resemblance, and for which it might be mistaken until definite and characteristic symptoms make their appearance. It depends on the observation of Widal that when some of the blood serum, i.e. the fluid part of the blood, taken from a patient suffering from this disease is brought into contact with living typhoid bacilli, they are seen, when examined under the microscope, to become heaped together in masses, and their motility is destroyed. This is known as *Widal's reaction,* and the test is never omitted in doubtful cases, or when a definite diagnosis is urgent. All that is needed is to obtain a few drops of the patient's blood from a prick made in a finger, in a special capillary tube, which is then sent away for the requisite manipulations to someone who is competent to make them.

Typhoid fever is communicated from the sick to the healthy only by means of the intestinal evacuations, or possibly the urine; it is not conveyed either by the breath or by the perspiration. It is not often transmitted directly to persons coming in contact with the patient, and medical men and nurses are rarely attacked when proper precautions are observed. But if cleanliness and

Transmission.

adequate disinfecting methods are neglected, and soiled bedclothes are not removed, the disease may be communicated to those in attendance.

We will now consider more in detail the various ways in which the poison of typhoid fever may be conveyed to the human body. In the first place, it may be conveyed by drinking-water which has become contaminated through sewage. Thus, the evacuations of a patient suffering from the disease may be thrown without being disinfected into a privy or on to the ground, the rain or falling soil water carries some of the material into a brook-channel communicating with a well, from which the inhabitants of a village habitually obtain their drinking supply. Shallow wells in loose, porous soil are particularly liable to become contaminated in this way from cesspools or privies or from ordure spread over adjacent fields. Or the water-pipes in a town may be leaky, and at one spot pass through soil soaked by the sewage from a particular house where a case of the disease exists. Or linen soiled by the discharges from a case may find its way to a laundry, where the slops leak into a well supplying neighbouring houses. A cesspool may leak into a brook which affords drinking water. At Caterham, in 1879, the water from chalk wells over 500 feet deep was contaminated by a workman suffering from a mild attack of typhoid fever, attended with much diarrhœa, who was employed in constructing an adit from one of the water company's old wells to a new bore which was then being sunk. Lastly, the poison may be sucked up from a water closet into a cistern which also supplies drinking-water.

By Drinking-water.

In the next place, milk may be contaminated by the poison of typhoid fever. This happens because contaminated water, due to defective sanitary arrangements at the farm or dairy, has been used either to dilute the milk or to wash out pails and milk-cans. When once the poison gains access to the milk it seems to increase very rapidly, and numbers of cases can be traced to a single dairy, such as in the outbreak which occurred in St. Marylebone in 1873, where nine-tenths of nearly 300 cases obtained "nursery milk" from a farm of which the occupier died from an attack of typhoid fever and the evacuations were buried in an ash heap outside the farm buildings. Thence the poison found its way into a well close by, the water of which was used for dairy purposes.

By Milk.

The poison may also be transported by currents of air. This is comparatively rare, but instances have been recorded of the exhalations from drains, sewers, or water-closets having communicated the disease by atmospheric contagion, provided, of course, the typhoid evacuations form part of their contents. Closed and unventilated drains are the most harmful. A drain thoroughly open to the air may be offensive, but is not so dangerous, and a sewage farm, if properly managed, is quite harmless. In this connection it is interesting to note that Dr. Climo has brought forward very strong evidence to show that dust may convey the poison in a dry state, and thus articles of food and drink may be contaminated. This applies more especially to India.

By Air-currents.

In certain circumstances food may be the means of conveying the poison. Of late years much attention has been called to the possible contamination of oysters by the discharge of sewage into the sea in the proximity of the oyster-beds. There can be no doubt that micro-organisms are found in oysters, and although salt water may be unfavourable to the development of the typhoid bacillus, it can hardly be described as a germicide. After the outbreak at Grimsby in 1903, and numerous others which have followed the consumption of oysters, there can be no doubt as to the necessity for the rigid exclusion of sewage from all estuaries where oysters are cultivated and dredged.

By Food.

One or two outbreaks of typhoid have been traced to ice cream which had been prepared from contaminated milk. Vegetables may be washed with contaminated water, and produce the disease when eaten uncooked. It is quite possible also that insects, such as flies, may carry infectious particles from patients with typhoid to vegetables and fruit. A few outbreaks, too, have been attributed to diseased meat, but on rather doubtful grounds.

Typhoid fever is widely distributed all over the globe. In the British Isles its frequency has diminished during the last ten or fifteen years. It may occur at almost any age, but seldom late in life. The period of greatest frequency is between the ages of fifteen and thirty. It is very rare in infants, and not common in children under three years of age; and, as a rule, children suffer from it in a milder and less complicated form. From the number of patients admitted into hospitals it would seem that males are more disposed to the disease than females, but as more males are usually admitted into hospitals than females, the liability to it is probably much the same in both sexes. Climatic influences certainly affect the prevalence of typhoid fever, although it may occur at all seasons;

Incidence of Typhoid.

there is an increase in the disease from August to November, especially after a hot and dry summer, while it is at a minimum from March to May. Unfavourable sanitary surroundings naturally act as important accessory agents in the propagation of typhoid fever, as is shown by the decreased mortality which attends improved conditions as regards water supply, sewerage, and housing. Peculiarity of constitution and individual susceptibility to the disease must not be overlooked. It is well known that certain families are liable to have the disease in a severe form, and this to some extent influences our estimate of a favourable or unfavourable issue. On the other hand, some persons seem to show a natural immunity from typhoid. Second attacks are infrequent; out of 2,000 cases at the Hamburg General Hospital only fourteen persons were attacked twice, and only one person three times.

Internal Effects.

Peculiar changes in the intestines, attended with ulceration, are always associated with this disease; and certain glands connected with the intestines—the mesenteric glands—and the spleen are enlarged. After the bacilli reach the intestines, they multiply and escape through their walls, and finally reach the blood and pass to the spleen and other organs. The bacilli manufacture certain poisons, some of which produce fever, and others, by their irritant action, cause intensely inflammatory changes in the intestines which lead to ulceration. During the first eight or ten days the feverishness is probably due to the direct action of the bacilli and their poisons. During the second and third week, when ulceration of the intestines has taken place, the fever is also partly accounted for by the absorption from them of unhealthy matter into the blood. The diarrhœa is partly caused by the irritation produced by the ulcers, and partly by catarrh of the intestines. Many of the complications of typhoid are attributable to other germs, which find a suitable soil for their propagation in the organs of the patient when he has been rendered very weak and much lowered by the fever.

Symptoms.

The period of incubation varies from seven to twenty-one days, usually ten to fourteen, and is not attended by any marked symptoms, the patient following his usual occupation and as a rule making no complaint. This stage gradually passes into the next, so that the actual onset of the disease is almost always insidious, the patient simply feeling out of sorts, with loss of appetite and disinclination for work. Bleeding from the nose is of frequent occurrence at this time, and is followed by pains in the limbs and back, chills, headache (often severe), tiredness and drowsiness. The patient now usually takes to his bed, and is found to be feverish, with a temperature of 103° or 104°; a quick pulse, but not usually above 100 a minute; and furred, moist tongue. He is thirsty, his abdomen rather full and tender, and even at this stage there may be some diarrhœa, but constipation is not at all uncommon. He complains of sleeplessness and of headache, his skin sometimes perspires profusely, and his urine is high coloured. This stage lasts about one week.

During the second week the fever will have reached its height—103°, 104°, or 105° in the evenings, and falling 1° or 1½° in the mornings. The headache usually disappears, the pulse is quicker, the skin remains moist, the tongue has a white or yellowish fur, but remains red at the edges and tip. The patient, as he lies in bed, except in very mild cases, looks dull, heavy, and apathetic, with a pale face but flushed cheeks, dilated pupils, and dry lips. He is noticed to be rather deaf, and at night may, in severe cases, be delirious. His abdomen becomes more swollen and more painful on pressure, the gurgling of liquid and gas can be felt on the right side, the diarrhœa increases, the motions have a characteristic appearance which has been compared to pea-soup, and there is a peculiar offensive odour with them.

Towards the end of the second week, from the tenth to the fifteenth day, the eruption may make its appearance. It is present in about three-quarters of the cases, and consists of small, separate, round, rose coloured spots, about the size of a pin's head. They have the feeling of projecting a little from the surface of the skin when touched, and if pressed upon they disappear for a moment, and reappear when the pressure is withdrawn. They come out on the abdomen, chest, and back, occasionally on the arms and legs. In number they are usually few, but may be very numerous. They do not all come out at once, but in successive crops, generally until the end of the second week, but sometimes much longer. Each spot lasts about four days, and then fades away.

During the third week these symptoms either subside gradually, as happens in mild cases, or become more severe. The patient lies on his back, and may be unable to turn over; there is a tendency to slip low down in the bed. He has a look of exhaustion, his body is emaciated; the tongue dry, brown, and cracked; the lips and teeth covered with a brown slime called " sordes "; the diarrhœa is persistent, bleeding from the bowel is likely to occur, and perspiration is apt to be profuse. Delirium is now very constant, the patient lying half unconscious, with his eyes partly open; or restless, muttering continually, and picking at the bedclothes or at imaginary objects in the air. When there is a tendency to congestion of the lungs or to heart failure, the face becomes dusky and blue, and in very severe cases the motions and urine may be passed unconsciously, and bedsores form unless the patient is very carefully and skilfully nursed.

In the fourth week convalescence commences, and is usually first shown by a gradual fall in the morning temperature, although in the evening it may still mount as high as before; thus there ensues a great difference between the morning and the evening temperature. The latter then begins to show a tendency to sink to a lower level, falling day by day until normal. The motions gradually become more solid, the tongue moist and eventually cleaner, the pulse improves in strength and grows less rapid; natural sleep returns, together with appetite and strength; and unless convalescence is interrupted by relapses or complications the improvement is maintained. In some cases, however, the fever does not begin to subside till the end of the fourth week, and may even be delayed until the fifth or sixth week. If the case is about to end fatally, the pulse becomes more rapid, the breathing more difficult, the patient unconscious and covered with clammy perspiration, the heart gradually fails, and death ensues. Sometimes the fever reaches an excessive height before the end.

Relapses.

Relapses, which are very common, occurring in from 3 to 16 per cent. of the cases, may happen about a week or ten days after the fever has subsided. Sometimes they apparently follow the administration of more solid food; they are attended by a fresh rise of temperature, and a recurrence of most of the symptoms above mentioned, such as swollen abdomen, diarrhœa, and a fresh outbreak of rose coloured spots. They are, however, of shorter duration than the original attack, lasting from nine to twenty-one days; the symptoms are not so severe, and they rarely prove fatal. A second, third, or even fourth relapse may occur. These relapses, which are probably caused by some of the poison, which has been stored up in some organ, being re-absorbed into the blood, must not be confounded with short rises of temperature occurring during convalescence. These may be due to an unsuitable diet or to constipation, and, according to Sir William Osler, are most frequently noticed in anæmic or highly nervous persons.

Such is the usual course of an attack of typhoid fever, but some special symptoms and complications must now be briefly noticed. The two most important are bleeding from and perforation of the bowels.

Hæmorrhage.

The former occurs in about 7 per cent. of the cases, usually after the second week. It may supervene earlier, and is then slight in amount and need not be regarded in an unfavourable light; when later, repeated, or excessive it must always give rise to grave anxiety, as the mortality from fainting (syncope) is very high, being from 30 to 40 per cent. of the cases. Even the worst cases, however, may recover. This complication is not usual in children. Sometimes the discharge consists of liquid blood; in less severe cases it is black, and looks like tar. When slight it need not be accompanied by any other symptoms, but when excessive the patient becomes pale and faint, the pulse feeble and rapid, and there is a quick fall in the temperature, the fever dropping from 2° to 5°.

Perforation.

Perforation of the bowels is a complication of the utmost seriousness. It is due to rupture of one of the ulcers in the intestines, and occurs usually after the second week and in about 3 per cent. of the cases. It is rare in children, and more frequent in men than in women, and may happen in mild as well as in severe cases. It sets in quickly, with continuous colicky pains, generally on the right side of the abdomen, and extreme tenderness. In some cases, however, both pain and tenderness are slight or even absent. The abdomen quickly becomes greatly swollen and drum-like, and does not move up and down when the patient breathes as it naturally does. The patient becomes collapsed, vomits, the temperature may suddenly fall, the pulse becomes extremely quick (140 to 200), the breathing distressed, the body cold and clammy, and death gradually ensues. Recovery very rarely takes place.

Other Complications.

Other complications of typhoid are the following: (1) Peritonitis without perforation; this commences more gradually than perforation, and the symptoms are less urgent. (2) Extreme swelling of the abdomen, called "tympanites"; this is not uncommon, and may favour perforation or disturb the heart's action by pressure. It is most usual late in the attack, and is distinguished from perforation by the fact that the up and down movements of the abdomen on breathing, although lessened, do not entirely cease. (3) Diarrhœa, which is one of the most characteristic symptoms, may become excessive, chiefly in severe cases. On the other hand, constipation is sometimes present early in the disease. (4) Congestion and inflammation of the lungs; this may be present without very marked symptoms. There is usually little or no cough, but there may be quick breathing and an increase of fever. (5) Clots in the veins may occur during the attack or during convalescence. They are caused by the feeble state of the circulation and a peculiar condition of the blood itself produced by the disease. It usually affects the large vein of the leg, the left more frequently than the right, and produces pain, tenderness, and swelling of the limb; and sometimes the vein itself can be felt as a cord-like lump. If the patient is convalescent when this complication sets in, the temperature rises again. The condition is tiresome, because it entails strict rest for at least six weeks, and dangerous on account of the liability of the clot to become loosened and fly to the heart, when it may cause sudden death.

Varieties of Typhoid.

Typhoid fever is a disease which assumes very diverse aspects. In children, as we have seen, it is sometimes known by the name of infantile remittent fever, so called from the evening temperature being 2° or 3° higher than the morning. It is known as "abortive typhoid" when the complaint, beginning with the usual symptoms, comes to an end in the second week. This form has been also called "fourteen-day fever."

Sometimes the symptoms are so slight that the patient goes about his work as usual, perhaps only complaining of headache, want of appetite, or diarrhœa. Bleeding from the bowels may occur even in these cases, and may be the first symptom which leads to a suspicion of the true nature of the illness. Such cases are called "walking" typhoid, or "latent" or "ambulatory" typhoid. Sometimes the whole attack may only last three weeks altogether, and the symptoms are not severe, the temperature never very high. These constitute the "mild forms" of typhoid. There is also a "bilious" form, in which there is continuous vomiting of bile and persistent and severe headache all through the attack. It is a very dangerous form, and often ends fatally about the end of the second week from exhaustion.

Diagnosis.

Widal's reaction, above referred to, constitutes the best means of coming to a conclusion in doubtful cases. During the first week it is difficult to be certain that the complaint is really typhoid, but the suspicion of its real nature is confirmed by observing the course of the fever, the appearance of the motions, and the rose spots during the second week. The diseases for which it may be mistaken are tubercular meningitis, acute tuberculosis of the lung, intestinal catarrh, and some forms of blood poisoning; but it more usually happens that at this stage it is entirely overlooked. In tubercular meningitis the temperature is not so high, there is more headache and vomiting *early* in the attack, the bowels are nearly always confined, and the abdomen is not swollen, but on the contrary may be hollow and boat-shaped; and often there is squint, and one pupil may be larger than the other. In acute tuberculosis there is more cough and emaciation, the pulse is quicker, the aspect excited rather than depressed. In intestinal catarrh, which may be due to tubercle, the course of the fever is more irregular, the tongue is more thickly furred, the motions pale from undigested milk, not "pea-soup" coloured. Some cases of blood-poisoning, such as childbed fever, or that associated with inflammation of the valves of the heart, may at times be undistinguishable from typhoid fever, and a correct conclusion can only be arrived at after the complaint has existed some time or after an expert examination of the patient's blood.

Mortality.

The mortality of typhoid has markedly decreased in this country owing to improved sanitary conditions, better methods of treatment, and more skilful nursing. It is now not more than 17 per cent. It varies in different epidemics, and is influenced by the age and sex of the patient, and by his antecedent condition. The disease is more fatal to women than to men, especially if pregnancy is present. In children it is less fatal, as they do not suffer so severely from the disease, and are more likely to recover from a serious attack. Some guidance as to the probable issue may be obtained from the pulse, the temperature, the nervous and intestinal symptoms. Extreme rapidity of the pulse, increasing day by day, or extreme feebleness with irregularity, are of unfavourable import. If the pulse reaches 140 in a grown-up person, it is a very grave sign. On the other hand, a slow, regular pulse is reassuring. A high temperature for a short time does not indicate any special danger, while a temperature remaining high for some time, especially if accompanied by indications of disturbance of the nervous system, is unfavourable. This shows the importance of taking the temperature at least every four hours, or even more frequently in severe cases. An unusually high temperature, "hyperpyrexia" (p. 90), especially if not much relieved by the application of cold, is of very unfavourable significance. Should the temperature fall suddenly, while the pulse remains quick, it denotes hæmorrhage or collapse. Muttering delirium, jerking and twitching movements, and the unconscious passing of motions and urine are ominous symptoms. Diarrhœa is not alarming unless persistent and excessive.

Treatment.

In the treatment of typhoid fever good nursing is of the utmost importance, and many a life is saved by the unremitting attention of a skilful nurse. The disease being one of such gravity, medical advice and guidance should always be obtained when possible. The patient should go to bed immediately the symptoms show themselves, and should not be allowed to get out of it again until convalescence is fully established. As this involves many weeks in bed, great attention ought to be given to the choice of the sick-room and of the bed on which the invalid shall lie. The room should be large and airy, and as isolated as possible from the general noise and traffic of the house; it should be well ventilated, and kept at a temperature of about 60°. All superfluous furniture, carpets, and curtains should be removed, and the greatest regard paid to cleanliness. The bed should be a firm spring one and quite narrow, and a draw-sheet and mackintosh should be arranged, and the various nursing arrangements made early in the illness as described in the chapter on Nursing. A bed-pan will be essential, as diarrhœa is common and rising from bed absolutely forbidden.

Daily washing and a constant supply of clean bed and body linen are required, and the patient's position in bed should be frequently varied to prevent congestion of the lungs and the formation of bed-sores. It is seldom that one person can nurse a typhoid patient, for the case is sure to be prolonged, the helplessness extreme, and constant attendance is imperative to guard against accidents.

Diet.

Diet is of primary importance, and must consist from beginning to end of the illness of easily digested and nutritious *fluids*. The bowel has many ulcerated, raw spots; solid food passing over them is sure to do harm, and many a case has been lost through giving a small solid meal in ignorance or mistaken kindness. The undigested portions of food in such cases so irritate the ulcers that they rapidly spread, and there may be bleeding, perforation, or peritonitis.

Milk should form the chief article of food, and many a case can be fed from beginning to end of the fever on milk alone. At least from 2 or 3 pints must be taken in the twenty-four hours, and the feeds should be given every two hours, except in the night, when one or two of them may be omitted if the patient is asleep. This will make each feed from 4 to 6 ounces. But milk does not agree with all patients. As far as possible the food for typhoid should not only be fluid but remain fluid, and milk does not fulfil this condition, for immediately it meets with the acid gastric juice it forms solid curd. The stools should therefore be watched, and if portions of undigested curd are passed in them, certain measures should be taken to modify the milk. It may be peptonised, or mixed with one-third of soda-water, Vichy-water, barley- or rice-water, or lime-water. If this is not successful, an artificial milk may be prepared by removing the curd altogether with rennet, the curd being strained off and cream and some special preparation, such as Somatose, Plasmon, or Sanatogen, being added to the whey to take the place of the curd. The following is a useful recipe: Take two to four teaspoonfuls of Sanatogen and make them into a paste with two or three tablespoonfuls of cold water; then add gradually, stirring all the time, a pint of warm whey, and finally a couple of tablespoonfuls of cream. This artificial milk should be given in the quantities previously recommended.

When milk is well borne it may be thickened with arrowroot, cornflour, or Benger's food; or it may be mixed with isinglass to form a jelly, or flavoured with tea, coffee, chocolate, vanilla, cinnamon, almond, or lemon.

Small quantities of beef tea or beef essences, chicken and strained mutton broth, clear soups, raw meat juice, and calf's-foot jelly may also be allowed, but if they are found to increase the diarrhœa they must be stopped at once. Eggs may be used, but should never be cooked; they should be beaten up with milk, boiling water, or broth; or the white may be beaten up with water—one egg to a wineglassful of water—to form albumen water, which can be flavoured with lemon and sugar and iced. The extreme thirst must be relieved by pure water and the various drinks recommended for fever, and alcohol in some form is usually required (*see* p. 89). Fruit should usually be forbidden, but grape pulp, after the careful removal of skin and pips, may often be taken if the diarrhœa is not troublesome.

As convalescence sets in the patient soon feels starving, and would eat anything if he got the chance, but it is necessary to be very firm on this point, for relapse will certainly be the result of mistaken kindness. No solid food must be taken until the temperature has been normal for at least a week, and then only with the greatest care. First, breadcrumbs may be soaked in beef tea, then bread and milk allowed in small quantity, custards and jellies, eggs lightly cooked, thin bread-and-butter, boiled sole, minced chicken, and finally butcher's meat.

The medicinal treatment is chiefly directed to meeting symptoms as they arise. Constipation, if not severe, need not cause anxiety. It

Drugs.

should not be remedied, even when severe, by purgatives, but by injections of glycerine, olive oil, or warm water into the bowel. During the first week of the illness, however, calomel in 2-grain doses once a day for two or three days in succession is very beneficial. Diarrhœa, if excessive, should be treated by injections of 4 ounces of weak starch and water with 20 drops of laudanum, or the latter may be taken by the mouth. Benefit is also obtained by the use of antiseptics to prevent fermentation and the formation of wind in the bowels, and by the employment of drugs to control the fever, especially if it tends to rise at all high—for instance, whenever it reaches 102°. For the former purpose we can recommend cinnamon oil, in capsules, 2 drops three times a day, the doses being gradually increased to 5 drops; or salol, 10 grains, in cachets, three times a day. For the latter the following powders may be used, contained in cachets:

PRESCRIPTION 150

Phenacetin	4 grains.
Sulphate of quinine	2 grains.
Citrate of caffeine	1 grain.

Make a powder, enclose in cachet.

One to be taken 3 times a day.

For excessive fever the bath and the cold-pack must be used (p. 90); for extreme distension with flatulence a turpentine enema, as described in the chapter on Nursing; for sleeplessness, tepid sponging of the body and limbs or a teaspoonful of Bromidia.

No untrained person would, one assumes, be so misguided as to undertake the responsibilty of treating the severe complications of typhoid. If hæmorrhage from the bowels occurs, the patient should be kept absolutely still and flat in bed, the diet should be reduced to the most digestible foods—which must be cold, fluid, and predigested (the curd of milk is objectionable)—and opium should be given to check all movements of the bowels. Laudanum, 10 drops in a teaspoonful of water every three hours until the patient becomes drowsy, can be recommended, or 20 drops as an injection into the bowel with 4 ounces of weak starch and water. Cold must be applied to the abdomen by ice in a bag or ice-water cloths. Turpentine, in capsules containing 10 drops, should be given every two hours.

If perforation of the bowel sets in, the great hope is that surgical assistance may be at hand, for apart from this there is nothing to be done but to keep the patient out of pain with opium.

The patient must be confined to his bed until the temperature has remained normal for a week. He may then sit up in an easy chair for a short time, which may be gradually increased as convalescence is established. Simple tonics will hasten his recovery, and from three weeks to a month after he first rises from his bed he may go away for a change of air.

It is possible that before long typhoid fever may be treated with injections of a curative serum which is formed by inoculating horses with a substance that consists of ground-up typhoid bacilli, but at present the method is only in the stage of experiment. The same may be said of an anti-typhoid extract prepared from the spleen, marrow, and lymph glands of immunised rabbits, a preparation with which very satisfactory results have in some cases been obtained.

A special anti-typhoid vaccine has been employed to protect against the disease in many hundreds of cases, and the consensus of opinion is that it greatly reduces liability to the disease. In epidemics protection may also be obtained by drinking no water or milk which has not been boiled, and eating no raw fruit or vegetables.

During the treatment of a case certain precautions must be taken to prevent the spread of the disease. As the poison passes from the body in the motions, urine, and perhaps the expectoration, these discharges must without delay be mixed with disinfectants, such as carbolic acid, 1 in 20. The utmost cleanliness of body, bedclothes, and clothing is essential. Anything that is soiled should be changed at once, and soaked in a 1 in 40 solution of carbolic acid or other disinfectant. All feeding utensils and sick-room requisites also require disinfecting, and the nurse should never eat without carefully cleansing her hands. The sick-room must be well fumigated at the end of the illness, and well ventilated before being again used.

TYPHUS FEVER

The name of this disease is derived from a Greek word meaning "stupor," which was used by Hippocrates and his successors to indicate a confused state of the intellect. It was not until 1759 that it was applied to a fever or group of fevers. Some have surmised that the Plague of Athens, recorded by Thucydides, was in reality typhus fever, and it is more than probable that some of the epidemics which raged on the Continent in the sixteenth century were of the same nature. In the same century, too, there occurred in this country the famous Black Assizes, when Bench, Bar, and jury were attacked suddenly by a fatal infectious illness contracted from the prisoners. This "jail fever" is one of the oldest synonyms for typhus. From its prevalence in armies, especially in defeated armies, it was also called "military fever" and "camp fever," while from its conspicuous rash it acquired the name of "spotted fever." In Ireland, which earned the opprobrium of being "the land of fever," the epidemics, which have been numerous and frequent, followed the periods of famine caused by failure of the crops: hence the name "famine fever" applied to it. The reforms carried out in our prisons, and the removal of filth and prevention of overcrowding in them and similar places, have been rewarded by such a measure of success that typhus fever has been practically swept out of this country. No epidemic has occurred since 1870, while isolated cases are rarely seen and only in persons of the lowest social rank.

Causes.

There is no doubt that deprivation, physical exhaustion, mental depression, overcrowding, and dirt strongly predispose to typhus; but from the analogy of many other contagious disorders it is almost a certainty that a specific germ which has hitherto not been clearly identified is the immediate and essential cause. It is also admitted that typhus is one of the most infectious of infectious fevers, and is frequently communicated by the sick to doctors and nurses. The disease may occur at any age, and one attack protects against a second, which is as rare as a second attack of small-pox.

Symptoms.

The period of incubation, during which there are no symptoms, is of variable length, between five and fourteen days. The disease commences with a violent shivering fit or with a mere feeling of chilliness, and is accompanied by a rapid rise of temperature, to 104° or over. A sense of profound illness follows, with headache, pains in the limbs, sleeplessness, thirst, loss of appetite, and coated tongue. These symptoms grow worse day by day, the patient becomes more prostrate, totters if he attempts to stand, and has a look of intense illness, with a dusky face and suffused eyes. His tongue soon becomes dry and brown, and in three or four days he can no longer keep about and takes to his bed, where he lies in a more or less dazed condition.

The Eruption.

On the fourth or fifth day the characteristic "mulberry rash" appears, first on the chest and abdomen, then spreading to the limbs. On first coming out, the eruption is something like that of measles, so that it is often called a "measly eruption." The spots may be separate or in groups, and they continue to come out and extend for two or three days. They then become of a darker and more livid colour, like a mulberry, a colour they retain even when pressed by the finger, and which is deeper on the back than elsewhere. The rash may last from a few days to a fortnight, and bears a distinct relation to the severity of the attack. Cases in which there is little or no rash run a mild course, whereas those in which the rash is copious and livid turn out to be severe.

In the second week the dazed condition of the patient passes into almost continuous delirium. This may be noisy and violent, with shouting, singing, struggling, and fighting, or some fixed delusion may take possession of the mind; or the patient may lie in a condition of stupor, his limbs jerking, or picking and fumbling at the bedclothes, at times muttering or becoming excited, especially at night, so that the closest watching is necessary to restrain him. The fever during this time continues very high, the pulse rapid, and the breathing hurried, the tongue dry and black like a parrot's; the urine, which is scanty, high coloured, and often albuminous, is either retained or dribbles away; there is generally constipation, but sometimes diarrhœa, the motions being passed into the bed. Such a condition may end in death towards the end of the second week, sometimes suddenly by failure of the heart, sometimes by congestion of the lungs, sometimes preceded by convulsions.

Jenner applied the term "coma vigil" to a peculiar condition met with in typhus fever. The patient may lie for a day or two with his eyes staring open as if wide awake, but all the time he is quite insensible to what is going on round about him, and his face is quite expressionless. There is no disease in which such a sudden and marvellous change from a condition of extreme danger may happen as in typhus. From the fifteenth to the twenty-first day a crisis takes place. The patient, who was lying either violently delirious or torpid, falls into a quiet and deep sleep which may last many hours, and awakes calm, refreshed, and with a normal temperature; the tongue rapidly becomes moist, the pulse quiet and firm, the skin perspires gently, a large quantity of urine is passed having a thick reddish sediment. Return to health takes place rapidly, with a ravenous appetite, so that in three or four weeks the patient is quite well again.

The crisis, however, may be masked or prevented by complications, such as bronchitis, which in some epidemics is very frequent and pronounced; or congestion of the lungs, which may turn to pneumonia and usually indicates a fatal termination.

The two fevers which are sometimes mistaken for typhus are relapsing fever and typhoid or enteric fever, both of which are found associated with it in certain epidemics, but as a rule all uncertainty is removed when the eruption appears, for this is absent from relapsing fever and is distinguishable by its extent and livid mulberry colour from the scanty rosy spots of typhoid. Other points of distinction are that the temperature rises quickly and ceases suddenly in typhus as compared with the slower onset and gradually decreasing fall in typhoid. The absence of diarrhœa, of swelling of the abdomen with tenderness and gurgling, of nose-bleeding, of hæmorrhage from the bowels, and of swelling of the spleen, must also be taken into consideration.

Diagnosis.

Sometimes, however, in children, it is not easy to decide whether a case may not be measles rather than typhus, but in the former the temperature falls as soon as the rash is fully out. In children also pneumonia, with head symptoms, may resemble the early stages of typhus.

The mortality of typhus fever varies with the age of the patient: the older he is the greater the danger; in children the fatal cases are exceedingly rare. The mortality also varies with the epidemic, some being mild, with a mortality of about 6 per cent., others malignant, with a mortality of 40 or 50 per cent. Intemperate habits have a very unfavourable influence. Among dangerous symptoms may be noted an abundant or very dark coloured rash, much nervous disturbance, such as early sleeplessness and delirium; the coma vigil above referred to is a particularly bad sign. Very high temperature, rapid pulse, and great prostration are disquieting, but cases which appear to be the worst are hardly ever beyond hope of recovery.

Treatment.

Every case must be isolated and plenty of fresh air allowed, as the poison seems to cling round the patient and to be in some way associated with the marked and peculiar offensive odour which emanates from him. The temperature of the room should be maintained at 60°, excess of light and all noise must be rigidly excluded. A nourishing diet is of the utmost importance in this disease, and should be as varied as possible, consisting of milk, eggs, beef tea, mutton, veal, or chicken broths—to which vermicelli or small pieces of bread may be added—meat juice, jellies, custards and blancmanges. Thirst may be relieved freely with any agreeable beverage, such as barley-water or lemonade. With regard to the administration of stimulants, as a rule they should be withheld in the early stages and in children; they are usually necessary, on the other hand, in patients over forty, in those who have been previously intemperate, and when there is great prostration, low muttering delirium, or tendency to heart failure. No treatment is known that will cut short the disease, but much may be done to relieve symptoms as they arise. High temperature seldom requires direct treatment by cold baths; cold sponging or the cold pack are better. As regards the use of quinine opinions differ: the late Dr. Murchison, a great authority on fevers, considered it useless even in very large doses, whereas Vogt, Liebermeister, and Mosler strongly recommend it in doses of 10 to 20 grains. The medicine usually given at the London Fever Hospital is dilute hydrochloric acid, 20 drops, with ½ drachm each of syrup and tincture of oranges in about a wineglassful of water every four hours. Headache may be relieved by an ice-bag to the head, taking care not to leave it on too long at a time, as it may have a depressing effect. In more severe head symptoms two or three leeches may be applied to each temple; in other cases where there is much stupor a blister on the forehead may be employed. For sleeplessness the bromides of potash and ammonium, 20 grains of each, should be given, and if they fail, 15 drops of Battley's sedative solution of opium in water at night, followed, two hours later, if necessary, by another dose. The use of opiates, however, in the later stages requires extreme caution.

Recovery, as we have seen, is usually rapid, and leaves no seeds of disease behind it, and it is only when the attack has been prolonged that some slight mental weakness remains for a short time. The period of infection comes to an end after four weeks, and the quarantine required after the latest exposure to infection is fourteen days.

CHAPTER XXXI

TROPICAL DISORDERS

Introductory—Sleeping Sickness—Kala-azar—Malaria—Tick Fever—Blackwater Fever—Yellow Fever—Dengue—Malta Fever—Plague—Cholera.

INTRODUCTORY

In this and the next two chapters we shall describe disorders which are especially prevalent in hot climates, and which for that reason are with fair accuracy comprised under the term " tropical diseases." They are not necessarily caused by excessive heat, for but few of them have been traced to this origin, but they are fostered and spread by the circumstances and climatic conditions which prevail in hot countries. For example, many of them are now definitely known to be produced by the presence in the body of minute animal parasites. Now these parasites, in order to develop and increase in numbers, require to pass through the body of some other creature besides man, such as the tse-tse fly. As these " hosts," as they are called, can only exist in tropical regions, such diseases can only arise in tropical climates. Other germs which, in their passage from one body to another, are destroyed by cold, are not so influenced by changes of temperature or climate when once they have entered the body and set up disease, and will live even when the affected person moves to temperate regions. For example, the malaria germ may continue to cause attacks of illness years after its victim has removed from malarious districts or possible exposure to the poison.

Europeans and all white races are specially liable to the attacks of these tropical diseases upon their first arrival in hot climates, and they should therefore take special precautions to avoid infection, and should assimilate their habits as far as possible to those of the inhabitants, who have attained to a great amount of immunity.

As those for whom these chapters are written are very likely to be far from medical aid when they become ill, such as missionaries in inland stations or persons far from civilisation on shooting or trading or exploring expeditions, it will be necessary to give directions as to the most useful drugs of which to lay in a stock. A medicine chest or case should be obtained, and should be taken to a good chemist to be furnished with the drugs most likely to be required, which will differ to some extent according to the locality to be visited. Portable cases or chests of various sizes and qualities to meet individual requirements can be obtained from chemists and surgical instrument makers, containing a stock of empty bottles for drugs, an assortment of useful instruments—scissors, forceps, thermometer—and simple surgical dressings, bandages, plaster, etc. They vary in price from ten shillings to several pounds.

The following list of drugs includes those most likely to be required, and the amount of each must depend upon the length of time they are to last and the diseases most likely to be met with. In many cases it is of great importance to reduce the weight as much as possible, and it will then be found that the drugs compressed in tablets will be a great advantage; they are compact, of uniform dosage, and are found to stand well changes of climate.

LIST OF DRUGS FOR MEDICINE CHEST

Drug	*Form*	*Ordinary dose*
Quinine sulphate	2- and 5-grain powders or tablets	2 to 5 grains.
Chlorodyne	fluid or 5-drop capsules	5 to 15 drops.
Dover's powder	5-grain powders or tablets	5 to 15 grains.
Opium	1-grain pills	1 to 2 grains.
Laudanum	fluid or tablets	20 to 30 drops.
Sal-volatile	fluid	½ to 1 teaspoonful.
Salicylate of soda	5-grain tablets	5 to 20 grains.
Calomel	1- to 3-grain pills or tablets	½ to 5 grains.
Cascara	2-grain pills or tablets	2 grains or more.
Aromatic chalk and opium powder	5-grain powders or tablets	10 to 40 grains.
Soda-mint	tablets	1 or 2 tablets.
Phenacetin and caffeine	tablets	1 or 2 tablets.
Ipecacuanha	5-grain tablets	as directed.
Tannin	powder	2 to 5 grains.
Warburg's tincture	fluid	1 to 4 drachms.
Easton's syrup	tablets	1 or 2 tablets.
Essence of ginger	fluid	5 to 20 drops.
Chlorate of potash and borax	tablets	for lozenges.
Boracic acid	powder	for lotions.
Permanganate of potash	powder	for lotions.
Carbolic acid	fluid	for lotions.

The facts set out in the following pages are largely founded on the writings of Sir Patrick Manson, a great authority on tropical complaints, and other workers in this field of medicine. Only those disorders which are most important and most frequently met with are referred to in any detail.

SLEEPING SICKNESS

This terrible disease, called also trypanosomiasis, has been known since about 1800, has been the subject of careful study and experiment, and is now becoming more familiar from its occasional appearance in temperate climates. But in all cases the poison is caught during a residence in the equatorial belt of Africa, in which district the disease forms a dreaded scourge that carries off annually thousands of natives and many white persons. The opening up of Africa seems to be definitely extending the area over which the disease is prevalent, and this fact has aroused the authorities to the importance of adopting widespread and energetic measures to check its diffusion and, if possible, stamp out the complaint. The causative poison is a minute animal parasite called a "trypanosome," and there is little doubt that an important, if not the only, means of its inoculation into the human body is by the bite of the tse-tse fly. The parasite, once introduced, increases in the body, but passes through a stage of incubation which may extend over two or three weeks before producing definite symptoms of its presence, and in some cases may be prolonged for two or even many years, as in people who have left Africa after infection.

Cause.

The symptoms come on very gradually. The first is fever, of a prolonged and indeterminate character, which has been hitherto looked upon as a distinct disease under the name of "trypanosome fever," but is now known to be only the initial stage of the condition which leads on to sleeping sickness. The fever is higher in the evening than the morning, sometimes disappears for several days at a time, only to return, and may continue in this irregular form until within a short time of the termination of the illness.

Symptoms.

In course of time other symptoms appear. The patient's character alters: he grows heavy and morose, loses all capacity for work, complains of headache and pains in the upper part of the chest, is troubled with constipation, and falls asleep whenever he has the opportunity. The lymphatic glands in the neck, groin, and, indeed, all over the body become enlarged, and can be easily felt. When addressed he answers thickly and indistinctly, but not unintelligently at first. If asked to walk he does so in a shuffling manner. The pulse and respiration are both quickened, sometimes remarkably so, but not necessarily in any definite proportion to the rise of temperature. In the later stages the drowsiness becomes lethargy, and the patient is always asleep unless purposely disturbed. The muscles of the tongue and limbs are now affected with trembling, the body grows weak and wasted, the skin rough, dry, and marked with eruptions. In the final stage lethargy passes into complete unconsciousness or coma, in which condition the fatal termination supervenes.

Course.

The disorder may last from six weeks to many months, or even a year or two, and in spite of occasional illusive periods of apparent improvement, always tends to take an unfavourable course and to end fatally. But to this statement a few exceptions are now known, for treatment is said to have saved some lives. The disease affects chiefly children and middle-aged adults, and consists in a slowly progressive inflammation of the spinal cord and brain and the membranes that surround them, implicating particularly the lymphatic vessels of these parts. The minute parasite is found without difficulty and in all cases, and is present in the blood, the enlarged lymphatic glands, and the cerebro-spinal fluid.

Treatment.

To treat such a formidable and fatal affection without special experience would be madness. Some special drugs have been employed, and are said to have produced relief and in some cases even a cure. The first is atoxyl, a preparation of arsenic; it is given by a deep injection with a hypodermic syringe twice a week. The dose, 1 grain or 10 drops of a 10 per cent. solution in water, should be gradually increased to as much as 6 or 7 grains, but lessened at once if poisoning symptoms—headache, stomachache, and nausea—appear. Another drug is trypanroth; it is given in 5-grain pills, but has the disadvantage that it stains the structures of the body. These two drugs should be administered in alternate doses, and continued for a long time. A third drug is chrysoidin, which is ordered as a hypodermic, $\frac{3}{20}$ grain every two or three days, gradually increased to ½ grain. With these measures the general health must receive attention. The patient should lead a quiet, restful life in a healthy climate.

The disease is said to have reduced the population of Uganda in six years from 300,000 to 100,000. To exterminate the disease it has been recommended that the belt of ground around the shores of Lake Victoria infested by the tse-tse fly—it is only from 15 to 30 yards wide—should be cleared of vegetation; and fords, ferries, and water-holes rendered healthy in a similar manner; and that the sick should be collected in camps and placed under treatment. The subject is now engaging the attention of the authorities.

KALA-AZAR

This disorder is of comparatively recent recognition as a distinct disease, but is known to be the cause of many deaths in the countries which it infests. In Assam it has caused severe epidemics, while in India, China, Upper Egypt, and parts of North Africa it occurs in more isolated form. A small animal parasite has been discovered in the blood of patients, and is believed to be the origin of the disease, but how it enters the body or is transmitted from one person to another is unknown.

Symptoms.

The illness may extend over one or two years, and in its early stage is easily mistaken for an attack of malaria. In this stage it consists of repeated attacks of fever with intervals of good health. During the attacks there is tenderness over the liver and spleen, and both these organs gradually enlarge. The healthy intervals become shorter and finally disappear, the fever at last being continuous. The body now wastes rapidly, and the patient grows anæmic and exhausted. In natives the brown colour of the skin changes to black, in Europeans there is a peculiar earthy grey hue. Swelling occurs about the ankles and in various other parts; the abdomen becomes much enlarged, bleeding is common from the nose, gums, or bowels; and finally, if improvement does not set in, the patient dies from exhaustion or from the attack of some other disease, such as dysentery or lung trouble. The parasite is found specially in the blood drawn from the spleen and liver of affected persons.

Treatment.

Treatment is not of much benefit in most cases. The patient should move to a healthy climate, keep himself warm, take nourishing food, and live a quiet, restful life. Even quinine, which it was hoped would prove to have curative virtue, is generally found useless, and this circumstance clearly distinguishes the disease from malaria, for which that drug is a specific. In spite of all treatment, as many as 96 per cent. of cases have a fatal termination.

MALARIA

Ague, or malaria, forms one of the most widespread and incapacitating scourges met with on the face of the earth. Not only does it carry off multitudes by death, but it incapacitates greater numbers by its exhausting and debilitating effects. It occurs in all parts of the world except the very coldest, but is far more virulent in the tropics, and its most favourite haunts are low-lying, marshy regions along the banks of rivers and lakes. The name is of Italian origin—*Mal-aria*—and shows the original idea of its cause. It has existed as long as history, and the most accurate accounts of it are those given by Hippocrates and Galen.

Cause.

It used to be believed that the poison was of vegetable origin, was formed by the decomposition of rank vegetation, and entered the body by respiration, as so many bacterial poisons are known to do. But these ideas were proved fallacious by the discovery in 1880 by Dr. Laveran, a French physician, that the poison was a minute animal organism which can be found in the blood in every case during an attack. But the mystery of the means by which this germ found admission to the body remained unsolved until 1897, when it was demonstrated that this was done by the mosquito, which inoculated the poison into the body of its victim in the wound caused by its bite. The spread of malaria is therefore most complicated. There must be (1) a person already suffering from the disease, with the parasite in his blood; (2) a special variety of mosquito to draw the poison from him into its own body; (3) suitable climatic conditions for the germ to thrive and undergo changes in the mosquito's stomach; and (4) a susceptible individual into whose blood this insect may transfer the properly developed germ.

Transmission.

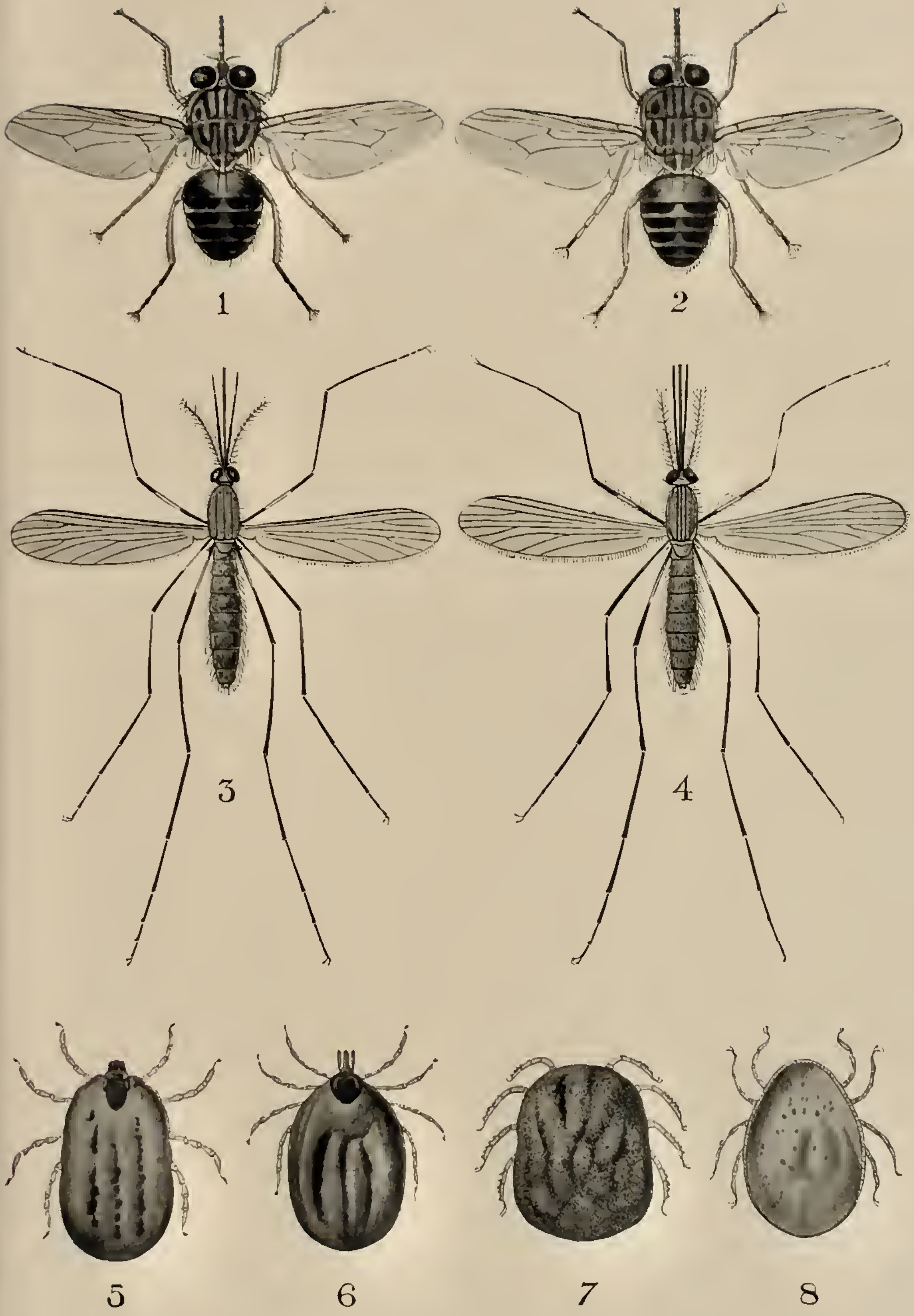
There is no longer room for doubting that the parasite causes the disease, this particular parasite being found in the blood of all persons suffering from malaria, and an injection of such blood into another person is followed by a manifestation of the symptoms of malaria. That the bite of the mosquito transmits the poison has been shown by conclusive experiments. For instance, the late Dr. T. Manson, Sir Patrick Manson's son, suffered from an attack after a bite from an infected mosquito in London, while a party of five persons lived in a hut for three of the most dangerous months of the year in the Roman Campagna, which is infested with malaria, and yet remained free from the disease simply by rendering their hut mosquito-proof with wire gauze. The parasite cannot be transmitted from man to man direct, but must pass through various stages of development in the stomach of the mosquito, and having done this, it occupies a waiting position in that insect's salivary gland until the mosquito bites its next victim. It then escapes into the blood of this person, dodges the watchful phagocytes in his blood if it can, attacks a red blood cell, and there settles down to raise a family. This it does by growing to as large a size as the red blood cell will permit, and then breaking itself up into a number (ten or twelve) of small round bodies, which form its progeny. These burst out of the blood cell and float free in the fluid of the blood, escape if possible the watchful phagocytes, and enter other red blood cells to start the process afresh. In this way the parasite passes through two cycles of existence in its life, one in the human body and another partly in the mosquito and partly in man. The breaking out of the progenies of young parasites is of especial interest, in that it is the phase at which the ague fit occurs, perhaps because in getting free in the circulation they carry with them poisonous substances. The various forms of fever to be later described occur at regular but different intervals of twenty-four, forty-eight, or seventy-two hours, because the time required by various forms of parasites to raise a new family occupies a similar number of hours.

The incubation period, as shown in experimental cases, varies from eight to twelve days. The ague fit is usually preceded by some premonitory symptoms for a few days, such as lassitude, headache, and chilliness, with disturbance of the digestion, causing loss of appetite and perhaps vomiting.

Symptoms.

The attack sets in with a violent shivering fit, the whole body feels cold, the teeth chatter, and the patient shakes from head to foot, his features becoming drawn and pinched and his skin looking cold and blue. Vomiting is very common. Throughout this stage the temperature rises rapidly.

This cold stage soon gives way to one of heat. The shivering ceases, flushes of heat come on, the skin is very hot and dry, the face flushed, the eyes red, the pulse rapid and full, the respiration quick. There is severe headache and giddiness, with noises in the ears; the back and limbs ache, vomiting and diarrhœa are frequent, and the patient throws himself about in a state of intense restlessness and may wander in his mind. During this hot stage, which may last



INFECTION-CARRYING INSECTS.

1 AND 2, TSE-TSE FLIES. 3 AND 4, MOSQUITOES. 5, 6, 7, AND 8, TICKS.

for several hours, the temperature rises to a great height, even to 104° or 105°.

The hot stage gradually passes into the sweating stage, and the patient's sufferings grow less. His whole body becomes bathed with sweat, which soaks his clothing and bedclothes. The symptoms subside, the headache, vomiting, and pains abate, and he passes into a quiet sleep. During this stage also the fever disappears, the temperature falling in a few hours to the normal.

Such are the three typical stages of an ague fit, and the changes of the patient's condition as he passes from one to the other are very remarkable, and are never forgotten when once witnessed. The fit is followed by an interval of comparative health, which varies in length according to the variety of malarial fever which is present.

If the fit be repeated every day it is called quotidian ague; if every other day, tertian; and if every third day, quartan. The explanation of these different forms of fever is that they are due to an infection by different varieties of the malaria parasite, which take for their growth and development one, two, or three days, as the case may be, and then set free in the blood large quantities of poison, and so originate the ague fit. The liability to recur at certain definite intervals and at the same time of day is very characteristic of malaria, and is called "periodicity"; and if a similar tendency occurs in other disorders, as in neuralgia, it raises a distinct suspicion that malaria may be at the root of them. The fits of ague continue to recur, and if untreated will either kill the patient by sheer exhaustion or gradually wear themselves out and disappear, but nowadays it is rare for a case to be left without treatment. After a first attack of fever the patient may seem quite himself, and show no sign of any serious injury to his organism, but as one fit follows another many serious departures from health show themselves, and must be looked upon as the later symptoms or perhaps the complications of malaria. Enlargement of the spleen is very common; it comes on in the acute stage of the fit, and at first passes away in the intervals, but finally this organ becomes permanently enlarged and hard, and can be felt or even seen in the upper part of the left side of the abdomen just below the ribs. The liver also is often enlarged.

Knowing what we do of the destructive powers of the germ upon the red blood cells, it is easy to understand that malarial attacks are rapidly followed by a severe form of anæmia. It is termed the "malarial cachexia," and is shown by great debility, weakness, and wasting of the body, with a remarkably earthy grey, sallow appearance of the skin.

Although the regular forms of intermittent fever we have already described are the rule, other forms are not uncommon in the tropics. In these the course of the fever is more irregular, the fever-free intervals may be absent or occur at uncertain times, that is, they tend to become *remittent* rather than intermittent, and far greater danger attaches to them.

Treatment.

During an ague fit the patient should be in bed, and should take no food at all, for it will only tend to make him sick. Whilst the cold stage lasts he should be wrapped up in blankets and have hot bottles put to his body and feet. He should be given plenty of simple hot drinks to warm the body and start perspiration, and, if vomiting is troublesome, to make it easier. If the vomiting is very distressing, a poultice or mustard plaster may be applied to the pit of the stomach. As the hot stage comes on the heavy coverings should be gradually removed, cold drinks may be taken or pieces of ice sucked, the body may be sponged all over with tepid water, and cold, wet rags or ice applied to the head. The sweating should be encouraged by drinking freely of harmless fluids, and the skin may be quickly dried with warmed towels. The patient should remain in bed until all fever has disappeared, and should be kept on light, nourishing food, given freely.

Quinine.

The one drug which is essential to the proper treatment of malaria is quinine, and it is hardly possible to imagine an ordinary case treated without it. This drug must be looked upon as a specific, for it undoubtedly destroys the parasite in the body and cures the disease. It is extracted from the bark of the cinchona tree, which is indigenous to the Andes. The appreciation of its value as a medicine is of very ancient origin; it is said to have been discovered accidentally by the Peruvian Indians, who noticed that they were cured of ague by drinking water into which the bark had fallen. It was first introduced into Europe by the Countess of Chinchon, wife of the Viceroy of Peru, in 1632: hence its name. It is also called "Jesuits' bark," for the Jesuits carried it to Rome, and it was consequently rejected by the Protestants. However, in 1679, Charles II. of England and the Dauphin of France were both cured of ague with cinchona bark by an English apothecary named Talbot, who later sold his secret for a large sum to Louis XIV., and it then became universally recognised as a cure for this malady. After enormous difficulties and with great perseverance the problem of acclimatisation was solved, and cinchona trees were planted and flourished in India. Quinine is the most important active principle of the bark, and is employed in medicine chiefly as a salt—the sulphate of quinine (though many other preparations are of equal value). It consists of white, silky crystals, with an intensely bitter taste, and it only dissolves at all freely in water when mixed with some acid.

Although this drug is of the utmost value, it produces symptoms of poisoning, called cinchonism, when taken in large doses. The symptoms of this condition are fulness in the head, noises in the ears, deafness, dizziness, flashes of light before the eyes, disturbance of sight, and sometimes even slight delirium; skin eruptions are also common, with swelling of the face. With most persons it takes a good-sized dose to cause such symptoms, but the present writer has met with an instance of but 2 grains causing the most extreme symptoms in a young man, whilst another person known to him takes a teaspoonful with impunity. One man's medicine, therefore, may literally be another man's poison.

In treating the ague fit it is best to wait until perspiration sets in, and then to give a dose of 10 grains, and continue with doses of 5 grains every six or eight hours for a week. This is Sir Patrick Manson's advice, and he considers the treatment an almost certain cure. Whilst quinine is being given in large doses the symptoms of cinchonism can be warded off by keeping the lower bowel empty, either by aperients—1 grain of calomel at night, followed by a dose of Carlsbad salts in the morning—or by large soap and water enemata. However, in milder cases of regular intermittent attacks—that is, cases of the tertian and quartan varieties—smaller doses are usually quite efficacious. Two grains of the sulphate of quinine, three times a day after meals, administered to a patient lying in bed, usually destroy the poison and relieve all symptoms in from twenty-four to seventy-two hours, but the drug should be continued for at least three weeks after the patient is up and about again.

Sulphate of quinine, as we have said, is most commonly used, and it is best to give it as a powder in a cachet or dissolved with a little acid. If tablets are used they should be ground up and dissolved. Pills and tablets have been known to pass through the body undissolved. A pleasant way to take the dose is to mix it with lemon or orange juice in sufficient quantity to clear up the salt. The following is a useful mixture:—

PRESCRIPTION 151

Sulphate of quinine	40 grains.
Tincture of orange	2½ drachms.
Dilute sulphuric acid. . . .	40 drops.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 or 4 times a day.

A preparation called euquinine is useful, especially for children, as it has only a slightly bitter taste; the dose is about half as much again as that of the sulphate—2 or 3 grains for a child of ten years. It may be taken in an acid mixture, in cachets or tablets, the two latter being washed down with a drink of lemon water or effervescing water.

If the patient is unconscious or vomiting is excessive the dose must be administered with a hypodermic syringe, the injection being given deep into the muscle of the buttock. The acid hydrochloride of quinine, 10 grains in 20 drops of water, should be used if possible, but other preparations are suitable in an emergency.

Warburg's tincture is a valuable remedy, the most active ingredient being quinine. A tablespoonful should be taken, and repeated in two or three hours. The bowels must first be well cleared and the stomach must be empty. Between the doses no food should be taken, but a little beef tea or brandy and water.

Excessively high fever (hyperpyrexia) must be treated by the cold bath or cold pack (p. 90), combined with a full dose of quinine.

To cure the serious ill-health and enlarged liver and spleen left by severe or long-continued attacks of malaria requires time and careful management. The patient should leave the malarial district and spend at least a year in some cool, healthy, bracing climate. He should dress warmly, take daily healthy exercise short of fatigue, avoid cold, damp, and great heat, eat moderately of simple food, and attend to the bodily functions. Quinine, in 2- or 3-grain doses, should be continued three times daily for three months, the dose being gradually reduced, and it should be followed with a course of iron and arsenic, as in the following mixture:—

PRESCRIPTION 152

Citrate of iron and ammonia . .	80 grains.
Solution of arsenic	24 drops.
Carbonate of ammonia . . .	24 grains.
Spirits of chloroform	2 drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day after meals.

The enlarged organs may be reduced by the application daily over the liver or spleen of liniment of iodine, by occasional doses of Carlsbad salts, with massage and hydropathic treatment. But nothing is better than a visit to a mineral-water station in a healthy climate, such as Harrogate, Homburg, Kissingen, or Carlsbad, where by drinking the waters, taking baths, using wet packs, and other methods, the health will be more rapidly restored.

To prevent a recurrence of the attacks it is necessary to take occasional doses of 2 or 3 grains of quinine as long as the patient has to live in a malarious district. Great care must also be taken to avoid the bite of mosquitoes; this risk is always limited to the night, at which time mosquitoes feed. The insects should be carefully excluded from the house by the use of fine wire gauze, and it is always best to sleep in the upper storeys of a house, as mosquitoes fly low. The bed should be surrounded with mosquito netting. If it is necessary to be out of doors whilst mosquitoes are about, the face should be protected with a veil, the hands with gloves, and the ankles with high boots or leggings.

The following drink is recommended by Italian physicians as a useful preventive: Cut a lemon into thin slices, place it—including peel and pips—in 1½ pints of water, and reduce it by boiling to ½ pint. Squeeze out the juice, strain, and add water and sugar to taste. The drink should be taken in the course of the day.

TICK FEVER

This fever is widespread throughout tropical countries, and is believed to be the same as "relapsing fever." The latter has been known since the early part of the eighteenth century, when it spread widely in epidemic form in Ireland. It is also called "famine fever" and "seven-day fever," the former from its especial liability to attack a population suffering from insufficient nourishment and the latter from the duration of the feverish stage. The disease is now rare in the British Isles, but is common in many parts of the world—in Africa, India, China, and elsewhere. Its cause long remained a mystery, but in 1873 there was discovered in the blood of patients a small parasite called a spirochæte, which has the appearance of a diminutive worm, and which swims about in the fluid of the blood amongst the blood cells during the attack of fever. This germ, however, cannot enter the body with the breath, nor apparently can it be swallowed with food, and it was only in 1897 that its mode of

Cause.

admission was discovered to be through the skin by the bite of the common bed-bug, and in tropical countries by the bites of minute creatures called ticks, which are very similar in appearance and habits to bugs. The ticks obtain the poison either by sucking it from the blood of an infected person or by inheritance.

Symptoms.

From two to ten days after an infective bite the symptoms of the disease set in suddenly, with chilliness, shivering, giddiness, headache, vomiting, and fever. At the end of the first day the temperature may be 104°, with quick pulse, occasional sweats, and sometimes delirium. The tongue is furred and moist, the bowels constipated, the spleen enlarged. Eruptions may appear, such as herpes on the lips and rose coloured spots on the body.

This condition lasts from five to seven days, when a free sweat or attack of diarrhœa occurs, and the temperature falls rapidly to normal. A fever-free interval of about a week follows, when another attack of fever sets in. This is a relapse, and may be succeeded in a few days by recovery, but in some cases one relapse after another occurs, each attack, however, being milder and shorter than its predecessor, until the poison seems to have worn itself out. There is not much danger in the case of healthy persons, but the old and debilitated may die from exhaustion, and it is due to exhaustion also that many a case ends in a long and tedious convalescence. Such attacks are at first easily mistaken for typhoid fever, but when one relapse follows another the nature of the trouble becomes evident. By finding the spirochæte in the blood the diagnosis is made certain.

Treatment.

For treatment no drug is of any avail, not even quinine, and the attack must be treated on general principles. The patient must go to bed and keep warm and quiet, take a fever diet, and, if there is great exhaustion at the crisis, a good dose of brandy or sal volatile. Experiments are being made in the preparation of a serum from protected animals, but this has not yet been used with success on the human subject. In the old days it would have been thought a grim joke to tell the famine-stricken victim of this disease that an insect powder or other vermin-killer was a certain preventive, but there is truth in it now that can be appreciated, for if the bites of bugs and ticks are avoided the disease will not occur. The mode of prevention includes thorough cleanliness of the body, bed-clothes, and house generally, a matter of extreme difficulty in many places in hot countries. The bed must be surrounded by a mosquito net, and raised well from the ground. A lamp should be kept burning by the bedside throughout the night, and insect powder should be well dusted between the sheets. The most valuable drug for use in this way is Persian powder, prepared from the flowers of the pyrethrum, which is cultivated in large quantities in Dalmatia for the purpose.

BLACKWATER FEVER

Blackwater fever is an acute fever occurring in the tropical regions of Africa, in Central America and the Southern States and the West Indies; in Greece, Sicily, and Sardinia, and more recently in some parts of India and the Malay Peninsula. It infests low, swampy districts, is more prevalent in the late summer and autumn and in the rainy seasons, and occurs in epidemics, attacking persons of whatever age or sex, especially those who have previously had malaria or dysentery, or have resided two to three years in infected localities.

Cause.

The cause of this disease has not yet been definitely ascertained; some consider it to be an unusually severe form of malaria, but against this idea it should be borne in mind that in some parts of India, where malarial fever rages, blackwater fever is almost unknown. It is true that the malarial parasite is often found in the blood of patients who have blackwater fever, but the parasite most commonly met with is one which produces the form of malaria that is the most unlike blackwater fever, and its presence in the blood is explainable by the fact that the two diseases are often prevalent in the same locality. Another theory is that blackwater fever is caused by the administration of quinine, but there is little evidence in favour of this hypothesis, which is totally rejected by so eminent authority on tropical fevers as Sir Patrick Manson. Probably the fever is caused by a specific germ which remains latent in the blood for a long time until roused into activity by cold, debility, the administration of quinine, or some other infection, such as malaria.

Symptoms.

The onset is sudden, with a severe shivering fit and bilious vomiting. The patient has fever, with pains over the liver and bladder; he passes urine of a dark-brown colour, which becomes darker and darker—hence the name—and his skin and eyes become saffron coloured. After a few days there is profuse sweating and the fever subsides, the urine becomes more abundant and lighter in colour, and finally regains its natural appearance. Relapses may persist on and off for weeks, leaving the patient extremely weak. In bad cases the bilious vomiting is excessive, and there may be suppression of urine, and death may occur from gradual exhaustion, or sudden fainting, convulsions, and loss of consciousness. Some cases are very mild and transient.

The best rules for the administration of quinine in this disease are those given by Bastianelli and approved of by Sir Patrick Manson.

Treatment. If black urine is passed during an attack of malaria and parasites are found in the blood, quinine may be given; if parasites are not found in the blood, quinine should not be given; if quinine has been previously given and no parasites are found, it should be discontinued; but if the parasites persist it should be continued. Put the patient to bed, keep his skin warm, and give a moderate dose of calomel. If there is a tendency to suppression of urine, apply hot fomentations to the loins and give milk diet only, and plenty of bland drinks. If nothing can be retained in the stomach, give repeated injections into the bowel of solution of salt, one teaspoonful to 1 pint of boiled water. Morphia, antipyrin, and phenacetin are dangerous, but Sternberg's mixture (*see* p. 175) may be administered with benefit, or 15 grains of tannin, well diluted, every two hours for four or five doses. Careful nursing is important, as the patient must not be allowed even to sit up in bed, and no attempt should be made to force the feeding until the stomach can retain and assimilate the food.

YELLOW FEVER

Yellow fever is a pestilential contagious fever caused by a germ transmitted to man by the domestic mosquito, *Stegomyia fasciata*. It chiefly occurs in the West Indies, and thence spreads in epidemics northward as far as the Gulf of Mexico and some parts of the United States; southward to Brazil, Uruguay, and the Argentine; westward to the Pacific coast from California to Peru. It has been imported into Spain, Portugal, and Italy, and cases have occurred at some seaports of France and England. In the East it is unknown. Yellow fever is incapable of maintaining itself except in hot climates, a temperature of over 75° F. being required; epidemics cease to spread in a lower temperature. It is chiefly met with in towns on the sea coast and in low-lying country, and does not often spread inland or to hilly districts. It never originates in rural districts, but especially affects the squalid and crowded localities near harbours. It clings to such places because the intermediary agent in propagating the disease, the stegomyia mosquito, finds there a suitable locality for itself. It is therefore unsafe for Europeans to visit these areas, whether they come into contact with the sick persons or not. On the other hand, they may visit a patient with yellow fever outside these areas with impunity, because there are no mosquitoes to convey the contagion. In this connection it may be mentioned that should Europeans be obliged to go into infected districts they should not do so at night. Natives of the place and residents are not so susceptible as newcomers, and the negro is very little liable to the malady.

Cause and Transmission.

A few words concerning the germ and the mosquito will now be helpful in understanding some of the phases of the disease, which is not communicated *directly* from the sick to the healthy, as is the case with scarlet fever and small-pox. The researches of Sternberg and others have shown that the disease may be produced by injecting blood from yellow-fever patients into susceptible persons; that the poisonous quality of such blood is destroyed at a temperature above 130° F.; that the germ is only present in the blood during the first three or four days; that it is so minute that it can pass through a fine porcelain filter; that the poison is a living germ, but so infinitesimal as to be invisible under the microscope, and that the disease can be transmitted to susceptible persons by causing them to be bitten by common West Indian mosquitoes which have been previously fed on patients suffering from yellow fever, but only those fed during the first three days of the fever are infective, and, further, not until twelve days have elapsed do they acquire their power of infection, which they retain for at least fifty-seven days. Another interesting fact about this mosquito is that the female must suck blood before she can lay any eggs, which she does three days after such a feed. During this time she bites both by day and night, but does not transmit yellow fever, any germ she may have in her body being undeveloped. After laying her eggs she bites at night only, and this explains why it is dangerous to visit yellow fever quarters by night, for the mosquito which bites in the day does not convey the germ.

The incubation period is not more than four or five days, but a fortnight at least always elapses between the importation of a patient suffering from yellow fever into a district and the first case of the outbreak which may follow. The explanation of this is that the germ which the mosquitoes suck from the blood of the original sufferer requires this time for its further development in the bodies of the mosquitoes before it can infect other people.

The symptoms commence with a shivering fit and those of high fever, with severe headache, chiefly in the forehead, and agonising pains in the back and to a lesser degree in the legs. The face is flushed, the eyes are red, the tongue is small and pointed, not swollen and flabby as in malaria. The throat and gums are swollen and sometimes bleed. The whites of the eyes become yellow, and the skin is "jaundiced" or even mahogany coloured, and has a fish-like odour. Bleeding may now occur from any part of the body; the urine, which nearly always contains albumen, may also contain blood, and what is known as *black vomit* may take place; diarrhœa with the same kind of black substance may supervene.

Symptoms.

During the progress of the disease, about the fourth day, the feverishness subsides, and what is known as the "period of calm" is entered upon, in which the pulse becomes very slow and soft, perhaps beating only 30 or 40 to the minute, and the patient very depressed and exhausted. This stage may last several days, and then convalescence may ensue, with rapid recovery, the patient being out again in about a week from the commencement of the illness. But in severe cases a period of reaction takes place, the temperature again rises, though not so high as before, all the symptoms grow worse, the patient may become unconscious and die, or else a crisis attended by sweating takes place with eventual recovery. A relapse may happen at any time within three weeks, and is usually caused by some indiscretion in diet, especially during the period of calm, when the desire for food returns somewhat. The mortality varies greatly in different epidemics. In children it is very slight. It also varies with the fever temperature: cases where this is not over 103° F. usually recover.

Treatment.

Administer a purge at the beginning, 2 to 4 ounces of castor oil; or calomel and quinine, 20 grains of each. The purge must not be repeated, and must be given before the third day if at all. Give frequent hot foot-baths with mustard during the first twenty-four hours, put hot mustard poultices to the pit of the stomach, and keep the patient wrapped up in blankets. If there is vomiting give $\frac{1}{10}$ grain of hydrochlorate of cocaine in a teaspoonful of water every hour for six doses. The use of morphia is considered dangerous in this disease. If there is restlessness give phenacetin, 10 grains; or antipyrin, 10 grains. When the stage of calm is reached and there is great collapse, give champagne or hock, iced if possible, or brandy in teaspoonful doses every half-hour; if they seem to increase the irritation of the stomach they must be stopped. Give Sternberg's mixture, as follows:—

PRESCRIPTION 153

Bicarbonate of sodium	150 grains.
Perchloride of mercury . . .	⅓ grain.
Water	1 quart.

Three tablespoonfuls every hour.

For the first two or three days give no food, only bland drinks; then tablespoonfuls of iced milk or chicken broth, gradually increasing the quantities. Solid food must be given very sparingly, even in convalescence, remembering the tendency to relapses, which are extremely dangerous. If the vomiting is so excessive that nothing can be kept down, give nutrient injections into the bowel.

The poison of yellow fever is not carried about in clothes, like most infectious diseases; it clings to places and to ships simply because they are infested by mosquitoes, in whose bodies the germ remains a long time alive. Should a case break out on board ship, the patient should if possible be taken ashore and the ship hurried north or south into a colder climate.

DENGUE

Dengue, also called dandy fever, breakbone fever, and three-day fever, is an infectious complaint somewhat resembling influenza, attended with severe pains in the limbs and an eruption. It is distributed in most parts of the tropical world, but is chiefly prevalent in the West Indies, occurring in remarkably sudden epidemics and attacking people of all ages. Nothing definite is known as to its cause, except that it is favoured by hot weather and has a predilection for the coast line and the valleys of large rivers.

Symptoms.

The period of incubation is short, one to three days, and the attack begins suddenly with pain and stiffness in a joint, generally a finger or toe, which quickly spreads to all the other joints until the whole body is racked with pain; the eyeballs ache excessively, the face is purple-red and puffy, the skin everywhere is flushed, the mouth and throat are red and congested. With these symptoms the pulse and temperature rise rapidly, so that within a very short time the patient is completely prostrate and has to take to bed. At the end of from twenty-four to forty-eight hours the fever begins to decline either slowly or suddenly, with sweating or nose-bleeding, the pains in the limbs and the headache cease, and, with the exception of a feeling of weakness, backache, and loss of appetite, the patient seems in comparative comfort. This interval or remission lasts about three days, after which the fever returns, accompanied by a measly eruption, which comes out first on the palms of the hands, affecting also the feet and knees. It may also resemble nettle rash, and extend more or less all over the body, being most profuse on the hands, elbows, and knees, and may give rise to a distressing feeling of tingling and itching. After a variable time, which may be only a few hours, but is usually two or three days, the eruption fades in the same order in which it began, and a branny scurfiness of the skin follows which may last for two or three weeks. The temperature usually falls to normal shortly before the disappearance of the rash.

After the symptoms have subsided the patient remains feeble and exhausted for some weeks, still tortured by pains in the joints, especially the smaller ones, and thus complete recovery is delayed, full restoration to health not occurring for months. The disease is rarely fatal, but relapses are very frequent and complications numerous, such as enlarged glands, inflammation of the testicle and heart, bleeding from the skin, mouth, or bowels. It is therefore a serious disorder, which requires careful treatment.

Diagnosis has to be made from scarlet fever, which at the outset it somewhat resembles. In dengue the fever rises high and rapidly declines, while in scarlet fever the period of decline extends over several days and the pains are not so severe.

Treatment.

Put the patient to bed until the eruption has quite disappeared. Emetics and strong purgatives are unnecessary, and only aggravate suffering by producing muscular movement, but a compound rhubarb pill may be given if the bowels remain confined. Give a mixture containing a teaspoonful of solution of acetate of ammonium, half a teaspoonful of sweet spirits of nitre, and 3 drops of tincture of aconite every three hours while the fever lasts. If the pains are severe give antipyrin or phenacetin in 10-grain doses, or 10 to 15 drops of tincture of belladonna, and rub the limbs and back with liniments of opium, belladonna, or chloroform. There is no objection to a hypodermic injection of morphia if those measures do not give relief. If the temperature is very high, cold sponging should be done. The diet should be the same as in other febrile complaints. Tonics, such as dilute phosphoric acid, 10 drops, combined with 5 drops of tincture of nux vomica in 1 ounce of water, are to be given during convalescence.

MALTA FEVER

This fever is common in Malta, but also occurs throughout the whole extent of the Mediterranean, including Gibraltar and Cyprus, and some cases have been described in South Africa and India.

Cause.

It was considered to be a form of malaria, and to have been taken into the body in the breath, but in 1887 a germ was discovered—called the *Micrococcus melitensis*—which by experimental inoculation caused the disease in animals, and is found in the blood and many organs, especially the lymphatic glands, of those suffering from the fever. How the poison leaves the body and is transmitted to other persons has been the subject of much investigation. It does not pass off in the breath, saliva, sweat, or motions, but has been found frequently in the urine. Whether it can be caught by actual contact is still uncertain, but the germ has been found attached to soiled clothing and bedding after many days. It is not breathed in infected dust nor drunk in unclean water. Some observers have accused the much-maligned mosquito of transmitting it by its bite, and this may prove to be one mode of infection. But there is another mode by which it undoubtedly enters the body, and that is by drinking the milk of animals suffering from the disease. Cow's and goat's milk, especially goat's, has been proved to contain the germ, and the number of cases of Malta fever, both in Malta and Gibraltar, has been enormously reduced since the drinking of goat's milk was stopped.

Symptoms.

The incubation stage is indefinite, being on an average fifteen days, but varying from six to twenty. The disease comes on gradually with fever, which runs quite an indefinite course. It is accompanied with pains in the head and limbs, and a feeling of increasing illness. The digestion is upset, the tongue furred, the appetite lost; there are thirst, constipation, and nausea, all of which make the patient so miserable and weak that he takes to his bed. The fever is worse at night, and may cause slight delirium, but a sweat often occurs towards morning and reduces it. During this stage the liver and spleen become enlarged and tender. After a week or two there is apparent recovery, only to be followed by a relapse, and the trouble spreads over many weeks or even months, with a succession of brighter intervals and relapses, leaving the body in a state of anæmia and extreme debility from which it takes long to recover.

Rheumatic pains are a common feature of the later stages, one joint after another becoming swollen and painful, and neuralgia may attack the nerves and shift its position without reason. Having said this we have said the worst of this complaint, for it is seldom fatal, and is to be feared more for the prolonged illness and ultimate debility rather than for any direct danger to life.

The disease is most prevalent in the summer months, and it is well to avoid its haunts at such times. Care must be taken by residents in infected places to boil milk, to avoid mosquito bites and the various possible sources of infection.

Treatment.

There is no special form of treatment whereby this tedious complaint may be cured or its course abbreviated. It is necessary to manage the case upon the ordinary principles which guide us in dealing with fevers, symptoms being met as they arise, and great care being exercised in the general nursing and feeding of the patient. The fever should be controlled by cold sponging and the wet pack (p. 90). During the feverish stages the diet must be fluid and nourishing, given frequently and in small quantities, whilst in the intervals it may consist of light milk foods, and puddings, fish, and white meats. Great care must be taken not to upset the digestion by over feeding, and yet to give plenty of nourishment to maintain the strength and obviate the great tendency to debility. The following summer should be spent in England or some other temperate climate.

PLAGUE

Cause.

Plague is a disease caused by a microbe discovered by Kitasato, the Japanese bacteriologist, communicable to man by means of the fleas which infest rats. It is probable that rats suffer from a form of chronic plague which does not affect their health, that the poison remains latent in their bodies for long periods, and that under certain conditions, the nature of which we do not at present understand, the poison from time to time acquires an increased virulence, and an epidemic of plague is caused through the medium of the fleas. The plague microbe multiplies in the stomach of these fleas for seven or eight days, so that the poison is not only carried but increased by them; and it has been on several occasions observed that a large mortality among rats precedes outbreaks of plague in man. Other animals may also be attacked and die of plague. It is dangerous to touch a rat recently dead of plague, for fleas are still alive in its fur and may bite and introduce the poison into the hands of the person handling it. When, on the other hand, rats have been dead for some time and their bodies are cold, there is no danger in handling them, for the fleas have left them; but the place where they died becomes highly dangerous, owing to the hungry and infected fleas scattered over the ground and floors. This explains how the poison usually finds an entrance into the feet and legs and produces the characteristic "bubo" or swelling in the glands of the groin.

The earliest known occurrence of plague is probably an epidemic in Libya at the commencement of the second century B.C. The pest appeared during the reign of Justinian, in 542 A.D., in Egypt, whence it spread over a large portion of Europe, and epidemics starting from Africa followed one another in the subsequent century. About 1346-7 A.D. that terrible epidemic called the "Black Death," originating probably in China, invaded and spread all over Southern Europe, and seems to have remained more or less prevalent in various parts of England for five or six years. From the fifteenth to the seventeenth century various epidemics occurred in Britain, culminating in the Great Plague of London in 1665. Since that time it has never visited this country with the exception of a few isolated and imported cases at Glasgow in 1901. It did not finally leave Europe, however, until 1841, having in the meantime gradually receded eastwards; but it still continued to be epidemic in Turkey, Persia, and Mesopotamia. Plague is now probably always present in some parts of India and China; and Madagascar, Cape Town, Durban, Sydney, Alexandria, and more recently the Western Hemisphere, have all been invaded by it.

The causes of the production of epidemics are very obscure, but it is reasonable to suppose that the poison, when once introduced, will tend to spread wherever overcrowding and filth prevail. Accordingly it is found that the mortality bears a direct relation to the cleanliness and social condition of the persons attacked. In the last epidemic at Hong Kong, for instance, the mortality was 93 per cent. among the Chinese and only 18 per cent. among Europeans, and in cities the cleanly districts usually escape. The disease, though contagious, is not nearly so much so as scarlet fever and small-pox; those in attendance on the sick do not usually take it, provided they have no unprotected wounds and adopt simple precautions. It may be conveyed, on the other hand, by food and drink which have become contaminated with sewage or excrementitious matter, or by infected rats, in whose mouth and urine the plague bacilli have been found. A certain degree of concentration of the poison seems to be necessary to propagate the disease, and it does not easily penetrate the unbroken skin, but probably finds an entrance through small wounds on the feet caused by the scratches induced by the bites of insects, which become inoculated with such germs as may be lying about the ground from the discharges of infected human beings or animals. But there is ample proof that the poison may also be conveyed under certain circumstances to man through the air. The ground floors of houses are always more dangerous than the upper storeys, a circumstance which has given rise to the proverbial expression, "Plague does not go upstairs." A moderate temperature and a certain humidity of atmosphere seem to favour an outbreak of plague, but probably epidemics are more closely connected with the influence which these conditions exercise on the migrations of the rat and on the breeding seasons of the rat-flea.

Symptoms.

There are two distinct forms of plague, called pestis minor and pestis major. The former, also called *abortive* or *larval* plague, is a mild disease of about fourteen days' duration, characterised by swollen glands, but hardly any fever or feeling of illness. Epidemics of this variety sometimes precede true plague, and are of great importance owing to their relation to the prevention and spread of the more serious disease. The incubation period of pestis major, or true plague, is usually three to five days, but occasionally in severe epidemics the illness may begin within a few hours after exposure to infection. The onset is usually sudden, with severe headache, giddiness, a staggering gait, and intense *malaise*. The aspect of the patient is very characteristic, being haggard and listless, with a pale face, inflamed and sunken eyes. After a few hours or a day, rarely longer, fever develops, perhaps with shivering, the temperature rising rapidly to 103° or 104°, or even to 107°. The pulse is always accelerated and very variable in strength, the skin dry and burning, the tongue swollen, rapidly becoming dry and black; the prostration increases, the countenance becomes more vacant, stupid, and bloated, and the patient either becomes delirious or, more generally, unconscious.

In nearly all the cases, at any time from the onset to the fifth day, buboes occur from inflammation of the lymphatic glands. These are one of the most characteristic features of the disease: hence the name *bubonic plague* sometimes used for the disease. In about three-quarters of the cases the buboes form in the groin, generally on the right side, less frequently in the arm-pit, and rarely, though more commonly in children, in the neck. They are very painful, at first hard, sometimes coming in groups, of which one gland enlarges more rapidly than the others. Their size varies from that of a walnut to that of a goose's egg, and the skin over them is usually doughy and sometimes becomes mortified, forming a carbuncle.

Other symptoms which are sometimes seen are profuse sweating, hæmorrhages from various organs and under the skin, where they form the black patches known in the seventeenth century as " tokens " and thought to presage death; engorgement of the lungs, diarrhœa, and severe bilious vomiting. If the case is going to recover, a profuse perspiration may occur between the sixth and tenth day, with gradual improvement in all the symptoms. Thus the delirium diminishes, the tongue becomes moist, and the pulse rate and temperature lessen, but the buboes get larger and softer, and after a few days burst and discharge offensive matter.

Convalescence is apt to be slow, owing to the discharge from the buboes, and to complications of the nature of mild blood poisoning, such as boils, abscesses, and enlarged glands. Should the case end fatally, death generally occurs between the third and fifth day, from exhaustion or heart failure; it may occur later from some of the complications noted above. Relapses do not often occur, but are extremely fatal.

The mortality is greatest at the commencement of an epidemic, often 80 to 90 per cent. In forecasting the probable course of a case, it should be noted that when the buboes discharge it is a good sign. Hæmorrhages, on the other hand, are of sinister significance. Sometimes apparently mild cases end fatally.

A case of fever with an enlarged gland occurring during an epidemic is more than suspicious. In the early stages all doubt may be removed by making an examination of the blood or other discharges. The bacillus of plague has marked peculiarities which it shares with no other known microbe.

Treatment.

There is no drug which acts as an antidote to plague, but a few years ago Dr. Haffkine prepared a serum from the bacilli which seems to act as a prophylactic to some extent. Jersin has devised a serum which has yielded good results both in a curative and a prophylactic sense, and other serums and vaccines are also in use. The treatment must be directed to the symptoms, avoiding violent purgation, emetics, and depressing remedies of all kinds, owing to the tendency to death from exhaustion and heart failure. Headache in the early stages may be relieved by ice-bags, high fever must be combated by cold sponging, vomiting must be checked by mustard plasters to the pit of the stomach, and an effervescent mixture which contains a little morphia and dilute hydrocyanic acid; heart failure demands the use of stimulants and strychnine, sleeplessness is best treated by a hypodermic injection of ⅛ to ½ grain of morphia, or of $\frac{1}{200}$ to $\frac{1}{75}$ grain of hyoscine; or chloral hydrate and bromide of potassium, 20 grains of each, may be given. Intestinal antiseptics, such as salol, in 10-grain doses, are useful in diarrhœa if it occurs.

The buboes require local treatment, such as the application of glycerine and belladonna, or poultices. When they suppurate they must be opened, and antiseptic dressing, such as iodoform, applied.

Special precautions have to be adopted by those who are in attendance on patients sick of the plague. Provide thorough ventilation, and enforce the utmost cleanliness. Do not unnecessarily come into contact with or take the breath of the patient, nor remain with him too many hours at a time, but seek the open air frequently. Carefully seal up all wounds, even slight scratches, on the hands, and protect them from accidental grazes by wearing leather gloves. Apply disinfectants freely both to yourself—especially as a mouthwash—and to the patient, and his evacuations and discharges. Wash your hands and face before eating, and never on any account eat anything in the sick-room. Wear boots and putties to protect the feet and legs from the bites of fleas, and do not allow any cats or dogs to have access to the patient.

CHOLERA

This terrible scourge is always present in some parts of the world, and spreads in occasional epidemics over immense areas. There is hardly any part of the world which has not, at one time or another, been visited by it, the exceptions being well isolated places like Australia and New Zealand. The focus from which many an epidemic has started is Lower Bengal, whence it can be definitely traced along special routes of traffic or pilgrimage, being always carried in its journeyings by man; and, unlike other epidemic disorders, never travelling more rapidly than man himself is able to.

Cause.

Many strange explanations of the origin of the pest were advanced in olden days, but in 1883 the special germ was at last discovered. It is called the "comma bacillus," from its shape, and it was found by Dr. Koch—the same Dr. Koch who invented tuberculin—in the intestines and in the motions of every case which he examined in his experiments. It is now acknowledged to be an invariable accompaniment of cholera, although some scientists still deny that it is the cause, for it has been swallowed both intentionally and by accident without giving rise to an attack. The germ is very minute, occurs in enormous numbers in the contents of the bowels, and continues to live and thrive outside the body if it finds its way into water. Everything goes to show that the bacillus is swallowed either with food or drink. That it is taken with the drinking water is proved by the history of many an outbreak, and that the germ finds its way into the water by means of the cholera stools, either directly or through an imperfect drainage system, is also certain. It becomes mixed with food by dirty hands or cooking utensils, or by being carried by flies. Apparently something depends upon the condition of the recipient of the poison, which renders him liable to attack. What this may be is not known, but there is no doubt that digestive troubles, especially slight attacks of diarrhœa, very commonly precede an attack of cholera. This "premonitory diarrhœa" is a matter of much importance, and everyone should recognise the danger of looseness of the bowels when cholera is known to be in the neighbourhood, and the necessity for at once checking it by appropriate treatment.

Whether preceded by diarrhœa or not, some three to six days after the poison is received into the body the symptoms of cholera come on.

Symptoms.

These are violent and constant actions of the bowels, with severe vomiting. The first motions are loose but coloured, and they are followed by a constant discharge of dirty water, which resembles that in which rice has been boiled: hence they have received the name of "rice-water stools." A very similar fluid is ejected by vomiting after the stomach is emptied of food. The quantities of water which thus pour from a patient soon produce intense collapse; the temperature falls very low, the skin becomes bluish, cold, and covered with clammy sweat; the face looks shrivelled and shrunken, and there are excessive thirst and restlessness. Added to these symptoms is the intense suffering of cramps, which affect the legs, abdomen, back, and, in fact, any part of the body, the muscles becoming hard, contracted, and knotted.

This state of cold or collapse may end fatally, or the patient's strength may outlast the exhaustion. In the latter case the stage of reaction sets in, during which the patient gradually returns to life, so to speak, from the arms of death. The failing organs recommence their wonted duties: the heart beats more freely and powerfully, the breathing grows deeper and fuller, the coldness disappears, the body grows warm, the skin natural in colour, and the kidneys, which may have ceased to act, again secrete urine. The process of recovery may be spread over several days, during which the patient gradually but surely renews his strength.

The case we have just described may be looked upon as an ordinary severe attack of cholera, but many are much slighter and have been called "cholerine," whilst many others are far more severe, and may end fatally in the course of a few hours.

Treatment.

The first matter to be considered is the treatment of the premonitory diarrhœa, which should at once be checked. Many a severe attack is apparently in this way cut short. The individual should at once lie down and take complete rest, get his body thoroughly warm, and indulge only in the simplest and least irritating food. He should take 10 drops of chlorodyne every hour or two (or two of the 5-drop gelatin capsules) with a dessertspoonful of brandy, and discontinue it as soon as the diarrhœa is quite checked. Or he may take 20 to 30 grains of the aromatic chalk and opium powder; an ounce of the Board of Health "cholera mixture," or a "cholera pill," composed of opium, asafœtida, and black pepper. If these are rejected by vomiting he should suck pieces of ice and put a mustard and linseed poultice to the pit of the stomach, when the medicine may be retained. If, in spite of this, the purging continues and the characteristic stools appear, it is more than likely that the digestive organs are in such a condition that no medicines can be absorbed. The patient must be kept absolutely at rest, and as undisturbed as possible; he must use the bed-pan, and not be allowed to rise from bed. The thirst and weakness will be best met with sips (not draughts) of iced champagne and soda water, or iced weak brandy and water. The cramps are relieved by gentle rubbing with dry powdered ginger. The room should be kept warm, though at the same time well ventilated, but draughts from the punkah should be avoided. Hot bottles around the body and warm bed-clothing are required to aid in warming the body. During the acute stages of the attack it is of little good to attempt to give nourishment: the vomiting rejects it, and the digestive organs are not in a condition to make use of it. In the less severe cases small quantities of light milk food may be given, and ordinary diet only returned to gradually and with great care as convalescence becomes established.

Some cases of extreme collapse have been saved by large salt-water injections (a teaspoonful of salt to a pint of water) under the skin or into the veins; severe diarrhœa during reaction has been relieved by large injections into the bowel of tannin and gum arabic, 1 ounce of each to 1 quart of water; suppression of urine, by hot fomentations or poultices to the loins, and plenty of milk and water to drink.

The most careful disinfection of all discharges from the patient and of all soiled linen should be carried out. The germ soon dies when deprived of moisture, and is best destroyed by heat. The clothes may be disinfected by baking, the motions by strong antiseptics (*see* chapter on The Sick-room). During the epidemic prevalence of cholera special precautions should be taken: people should do all in their power to keep themselves in vigorous health, and do nothing which would depress their vitality or disturb the action of their organs. Excessive fatigue, mental anxiety, extreme fear of infection—all injure the health through the nervous system. The eating of raw fruits, indigestible vegetables, such as cucumbers and melons; unsuitable foods, such as game, stale fish, or shell-fish; and the excessive use of alcohol injure the health through the digestive organs. Aperient medicines, and especially salt purges, are to be avoided, and exposure to cold must be looked upon as highly dangerous. The utmost supervision must be exercised over the food and drink, and no food should be eaten that has not been well cooked. No water or milk which has not been previously boiled should be drunk, nor should unboiled water be used for washing the body or food utensils. Exposure to the poison should be shunned, and contact with the sick avoided, especially by newcomers, who are more liable to infection than old residents. No drugs are known which protect the body from the poison, but as the result of some very interesting experiments a protective serum has been prepared, called "Haffkine's vaccine," after its inventor, of which two injections are given at five days' interval. The results have proved that a high degree of protection is thus conferred.

Precautions.

The measures carried out by public authorities have for years proved an effective bar to the spread of cholera from cases imported into this country. They consist in a pure water supply and an efficient drainage system, the isolation and supervision of all suspected cases, and of those who have been exposed to infection, and the careful disinfection of the excreta and soiled clothes of patients. The stringent quarantine regulations still required in some countries have proved quite ineffectual to prevent the entrance of the disease, and have been withdrawn in this country in favour of sanitary measures.

CHAPTER XXXII

TROPICAL DISORDERS (*continued*)

Dysentery—Sprue—Hill Diarrhœa—Tropical Liver and Liver Abscess—Beriberi—Leprosy—Sunstroke.

DYSENTERY

This disorder is productive of an enormous amount of illness in tropical countries, and probably in this respect takes second place only to malaria. It sometimes appears in the form of an epidemic, and extensive outbreaks have spread over large areas of Europe on many occasions; but epidemics of a more localised character are more common, and are met with in many countries, though for more than half a century nothing of the sort has occurred in England. What have been called "institutional" epidemics are, however, still seen in England as well as other countries, the disease breaking out in barracks, asylums, or gaols, where large numbers of persons are collected under the same roof. In tropical countries, however, the most common form of the disorder is that in which it adopts a permanent residence in a district and is constantly making itself more or less evident: this is what is termed endemic dysentery.

It is not strictly accurate to call dysentery a tropical disease, for it is met with all over the world, but it is tropical in the sense that it seems to find in hot climates just those circumstances which favour its development and which render it more prevalent and permanent. Not only does it show a preference for hot climates, but it is specially active in the hot months of the year and in periods of excessive heat and drought. Further, it is encouraged and spread by the insanitary conditions to be found in places where the drainage is unsatisfactory, the inhabitants are overcrowded, the food is bad, and—more important than all—where the water supply is inadequate and polluted with sewage.

Transmission. Though the nature of this disease, and the way in which it is propagated, are involved in obscurity, it cannot be doubted that the poison is in many cases taken into the body in the drinking water; for in certain towns where it was constantly present the introduction of a pure water supply has at once been followed by a remarkable decrease in the number of cases. This knowledge is of great importance, for if no water is drunk except that which has been proved to be pure, or which has been made so by boiling, the risk of infection is enormously diminished.

Predisposing Conditions.

Added to this there are certain conditions which render an individual prone to infection. All disturbances of the digestion are dangerous, and should receive instant attention if dysentery is rife. It is important, also, to avoid irritating or bad food, to relieve constipation, to check diarrhœa, and to remove all possible sources of ill-health. Sound health is a great safeguard against dysentery, and it would seem that a healthy digestion in a sound body is able to dispose of the poison should it have gained entrance. Exposure to cold is most dangerous, and should be sedulously avoided.

The term dysentery is known to include many different affections caused by different kinds of germs, and it is best to look upon the disease as simply a collection of certain well-marked symptoms which are produced by many causes, some of which are known to be germs, whilst others remain a mystery. Of these symptoms the chief are frequent actions of the bowels, with the evacuation of much slime and blood, griping pains in the abdomen, and constant straining. These are set up by an inflamed and often ulcerated condition of the lining membrane of the large bowel.

Symptoms.

The attack may be sudden, with severe diarrhœa. The stools, which at first consist of the natural contents of the bowel in a watery condition, gradually grow scanty and dirty brown in colour, and are formed of slime and blood only. The necessity for straining becomes overpowering, and there is hardly any interval between the actions. This is often called catarrhal dysentery. If ulceration affects the bowel the motions contain more blood, with dirty, greyish shreds, and smell most offensively. The trouble may last but a few days or a week; may disappear for a time, only to return, or may drag on for months, passing into the obstinate condition of chronic dysentery. Happily the disorder is not very dangerous to life, and gradually tends to recovery; but if it is not treated with care the patient is likely to drift into a state of permanent ill-health and debility, with impaired digestion and chronic diarrhœa.

One variety of the complaint, which is well recognised, is called *amœbic dysentery,* from the presence of a minute creature (the amœba) in the bowels. It is of insidious onset, slow progress, and long continued course, with frequent relapses, and is very likely to be complicated with abscess of the liver, a very serious affection (p. 193).

Treatment.

The treatment of a case of dysentery is difficult and somewhat complicated, and should not be undertaken by unprofessional persons unless medical assistance cannot be obtained. There are several methods of treatment, but as none of them is certain to cure any individual case, it is necessary to try them in turn, and we will briefly indicate the course which it would be wise to pursue.

The first and most essential factor is absolute rest in bed, and for this reason a bed-pan should always be employed. The bed-clothes should be warm, and a hot bottle should be used to maintain the body at a comfortable temperature. A linseed poultice, hot fomentation, or turpentine stupe should be applied all over the abdomen and renewed as frequently as necessary.

A carefully selected diet is of primary importance, for the great aim of treatment is to remove all causes of irritation from the bowels. The food must therefore consist of the simplest and least irritating of articles, which leave but little residue to pass through the large bowel, the part chiefly affected. Milk is the best food, and may be given pure or diluted with an equal quantity of barley- or rice-water, or half the quantity of lime-water. Peptonised milk often proves very satisfactory. Occasionally, especially when the tongue is furred, milk cannot be digested, and we must then employ albumen-water, chicken-tea, weak beef-tea, or barley-water. The food should be given in small quantity—half a tumblerful—every one or two hours, and only just warm. No solids are permissible, and no alcohol, except for extreme exhaustion. As the symptoms abate, starchy foods, as arrowroot, well boiled rice, etc., may be added to the milk. Ordinary diet must only be allowed with great care and circumspection, a normal appearance of the stools being the chief indication. These should be carefully watched throughout the case. Slime, blood, and shreds are signs of disease, whilst a gradually returning normal colour shows progress towards health.

In the matter of drugs the first dose should be a tablespoonful of castor-oil with 20 drops of laudanum, given as early in the attack as possible; it clears away the irritating contents of the bowel and then acts as a sedative. If symptoms continue, what is known as the ipecacuanha treatment should be carried out. Absolute rest is essential; the food must consist only of milk two-thirds, barley-water one-third; a tumblerful to be drunk every two hours from 6 a.m. to 6 p.m. At 9 a.m. 15 drops of laudanum should be taken in a dessertspoonful of water, and a mustard poultice applied to the pit of the stomach for twenty minutes. At 9.20 p.m. six of the 5-grain ipecacuanha tablets should be swallowed with half a wineglassful of water, and the patient must then lie flat on his back, with his head low, and must not eat, drink, speak, or move for four hours. He must not swallow his saliva, or it may start vomiting. On the following day the same treatment should be repeated, but only five tablets should be taken. On the third day omit the laudanum and take only four tablets, reducing the number of tablets by one each day, continuing the single tablet to the tenth day and then stopping it. A gradual return to ordinary food should at the same time have been made, but meat, alcohol, and coffee must not be resumed until the treatment has ceased. Large, yellow, loose motions show that benefit is to be expected, and they must not be checked.

If this treatment is unsuccessful, in mild cases try purging doses of sulphate of soda, a teaspoonful to be taken in a little hot water every three or four hours until blood and slime have disappeared from the motions. The intense straining is relieved by an enema of 30 drops of laudanum in a wineglassful of thin starch. If malaria is a concomitant of dysentery, quinine should be combined with the other drugs.

In *chronic dysentery* the ipecacuanha treatment should be tried, and the bowel should be washed out daily with an injection of a pint or two of warm water with a dessertspoonful of boric acid to the pint. But this inveterate disease usually requires a change to a temperate climate, with careful avoidance of cold and constant regulation of diet, which should be nourishing and yet very simple.

SPRUE

This disorder is not at all uncommon, and chiefly affects Europeans who have lived for many years in tropical climates. It is sometimes set up by the various unhealthy conditions of residence in hot countries, but often follows attacks of dysentery or chronic diarrhœa. Its cause is unknown, but the symptoms are produced by a chronic inflammatory condition of the lining membrane of the alimentary tract, which affects all parts, from the mouth to the rectum. A curious feature of the disorder is that the cause, whatever it may be, may lie dormant for years and break out a long time after the person has returned to temperate climes.

Symptoms.

The disorder begins with diarrhœa, which is chiefly troublesome in the morning, and continues for months, being better at some times, at others worse. The mouth feels sore, the tongue becomes red and painful, with sore spots on its side and edges. The digestion is disturbed, there is a sensation of weight, oppression, and distension, and there is flatulence, with frequent rumblings. The stools gradually assume a peculiar aspect, losing their normal colour and consistence and becoming pale, dirty grey, and frothy, and being extraordinarily bulky and offensive, as if all the food were being passed through the body without being digested and undergoing decomposition in the process. They would be found, if examined, to contain large quantities of undigested fat, and to be full of the gas bubbles of fermentation. The loss of nutritive material soon causes debility, weakness, and wasting, which is shown by extreme emaciation and a dark, sallow, and anæmic appearance. The complaint may be spread over one year or over many, but always tends in a downward direction, and if neglected will end fatally. It is of the utmost importance, therefore, that its seriousness should be recognised, and that treatment should be started early, for the sooner it is commenced the more hopeful are the prospects of recovery.

Treatment.

The principles of treatment are well recognised, and if it is steadfastly carried out a cure may be expected; but this requires more determination and self-denial than many persons are able to summon to their aid. It consists in living on milk, and milk alone. The patient should take a good dose of castor-oil, and go to bed in a large, airy, well-warmed room, having clothed himself in woollen garments. The milk should be taken in small quantities, 6 ounces every two hours, with two meals omitted in the night, which makes 3 pints in the twenty-four hours. After a few days it should be gradually increased in amount by adding an ounce to each meal until it aggregates 5 pints in the twenty-four hours, or even 6 or 7 pints, according to the progress the patient makes. It should never be taken in draughts, but drunk from a teaspoon or through a tube, and this diet should be adhered to rigidly for six or seven weeks. Then a raw egg; light, starchy, soft food; biscuits, toast, fish, and chicken may gradually be introduced. But upon the slightest return of any of the symptoms the milk treatment in bed should be returned to without delay.

This abbreviated description of the milk treatment as prescribed by Sir Patrick Manson would be incomplete without reference to the one exception which he allows, and that is the use of small quantities of fruit. Strawberries, one or two with each milk meal, appear to be the best form of fruit, but bananas and apples are also permitted.

When milk disagrees the "Salisbury diet," to be described in a later chapter, has been recommended.

If the patient's circumstances permit, it is best for him to leave the tropics and seek a more temperate climate. He should live most carefully, avoiding all exposure to cold, all over-exertion, and all depressing conditions, and should pay the utmost attention to his diet, taking only those foods which are easy to assimilate and cause no irritation to the sensitive digestive organs.

HILL DIARRHŒA

This name is given to a severe form of diarrhœa which is liable to attack those who visit the hills after residence in the plains of tropical countries. It is chiefly an Indian disorder, but has been described as occurring in other countries in similar circumstances. The symptoms are very much like those of the initial stages of sprue, and the chief distinction between the two affections is in the circumstances under which they occur. The diarrhœa occurs chiefly in the early morning, the motions are large, watery, and colourless, and there is much trouble from flatulence. Although the disorder may disappear when the patient has become accustomed to the change of climate, it is often only when he returns to the plains that he gets thoroughly rid of it. Apart from this, the treatment consists in rest, warm clothing, and a milk diet. Dr. Crombie, who fully describes the affection, advises a teaspoonful of the solution of perchloride of mercury with water fifteen minutes after meals three times a day, and 12-grain doses of lactopeptine two hours after. In chronic and recurring attacks a change of climate is imperative.

TROPICAL LIVER AND LIVER ABSCESS

Few Europeans pass many years in tropical climates without being made aware of the fact that they have livers by some unpleasant symptoms or sharp attacks of illness. This is due, to some extent, to want of knowledge as to how they should accommodate their habits to their altered circumstances, but even more to carelessness or indifference. The great heat renders them far more liable to chill from free perspiration and exhaustion, or from sleeping with insufficient covering. It also encourages lazy habits and the neglect of active exercise, and thus lays the foundations of a congested state of the liver. Indolent habits often lead on to indulgence in eating, to excess in the use of alcohol and tobacco, and to long hours in bed, all of which produce sluggishness and inefficient action of the liver. A cold caught in such circumstances is exceedingly likely to turn a congested state of the liver into an inflammation. The most common diseases of the tropics also constantly involve the liver, for malaria, dysentery, and diarrhœa all set up unhealthy conditions in this organ. It becomes enlarged, gives rise to a feeling of weight or dragging in the right side, with an aching in the right shoulder. The digestive organs are deranged, the appetite fails, flatulence, acidity, and heartburn are developed; the urine becomes concentrated, high coloured, and loaded with deposits; the bowels are constipated, the motions pale from deficient bile, and many an attack of diarrhœa is set up by quite insignificant causes. As a natural consequence the general health suffers, the body wastes, the strength fails, the complexion grows sallow and anæmic, and the patient becomes a chronic invalid, absorbed in his ailments, and especially in the state of his liver.

Tropical Liver: Causes.

Symptoms.

To prevent such a train of circumstances is quite possible in most cases. The diet must be curtailed, all indigestible and highly seasoned dishes avoided, and animal food taken with great moderation; alcohol should be given up or taken most circumspectly. Daily exercise must be indulged in morning or evening, but to a point short of exhaustion; exposure to chills or the heat of the sun must be avoided, and the bowels must be carefully regulated by simple saline aperients, such as mineral waters or Carlsbad salts. An occasional holiday, also, in a temperate climate is very beneficial in dissipating the ill effects of the tropics, and much good may be expected from a visit to some mineral spa, with the régime that is there observed. Hydropathy in the form of baths, compresses, and wet packs often relieves chronic congestion and enlargement of the liver, and an acid compress to the liver region can be recommended. It is prepared by mixing 1 ounce of dilute nitro-hydrochloric acid with 1 pint of warm water, and applying it soaked in a flannel and covered with oil silk.

If symptoms of inflammation of the liver supervene, accompanied with fever, confinement to bed is requisite, with milk diet, free purges, poultices to the liver region, and 20-grain doses of chloride of ammonium well diluted with water, three or four times a day. Malarial infection must be corrected with quinine and dysenteric with ipecacuanha, as elsewhere described.

Liver Abscess.

When inflammation of the liver appears as a complication of dysentery, there is another serious danger to be considered, and that is abscess of the liver. Whether this disorder ever occurs apart from dysentery is still uncertain, but undoubtedly the vast majority of liver abscesses are dysenteric in origin, and occur in that form of the disease which is characterised by the presence of the amœba parasite. This little organism is often found in the discharges from the abscesses, and is believed to find its way thither by the veins from the ulcerated spots in the bowel. The symptoms of liver abscess therefore follow attacks of dysentery with an interval of perhaps weeks, or even months. They are discomfort and weight in the right side, pain in the right shoulder, enlargement of the liver—an enlargement which can be both felt and seen—with tenderness on pressure; fever, especially of an evening, free sweats at night, wasting of the body, with serious derangement of the digestive organs. If the abscess be not now opened by a surgeon, it is likely to grow to an enormous size, destroying the liver substance, and may finally burst into the lung, into the pleura, or into the bowel, the first being the most frequent termination. In such a case large quantities of chocolate coloured, jelly-like matter are coughed up, and under favourable circumstances the abscess may heal. But the most hopeful termination is that brought about by a surgeon's knife, with which an opening should be made, an india-rubber drainage tube inserted and the discharge allowed to escape until the abscess cavity closes in and heals. It should be understood that abscess of the liver is a serious affair even under the most favourable conditions.

BERIBERI

Beriberi, also called " kakke " in Japan, is a peculiar disease affecting the nerves all over the body, and occurring in certain special localities, or in epidemics. It prevails in most tropical and subtropical climates, particularly in the Malay Peninsula, Japan, China, and India. Epidemics of it occur in hot or rainy seasons, in prisons, mines, armies, and ships. Neither sex, age, health, nor social position seems to exercise any influence over its occurrence, but it more readily attacks those who lead sedentary and indoor lives, the inmates of schools and asylums, and women who are pregnant. Overcrowding seems to play an important part in its production, especially when associated with want of light, insufficient ventilation, and a warm, damp atmosphere. Such conditions were found by Sir Patrick Manson to exist in one of the ships from which a number of cases were admitted into the Seamen's Hospital at Greenwich. Feeling the cold of the English climate, and wishing to keep their cabins warm, the Lascars produced a hot, steamy atmosphere and a sodden state of their quarters, which resembled an incubator on a large scale; and if the germ of beriberi already exists in such a place, it rapidly becomes active and deadly. A similar state of things prevailed at the Dublin Lunatic Asylum, where several cases of beriberi broke out in the overcrowded dormitory in warm weather, with its closed doors, barred windows, and breath vapour streaming down the walls.

Cause.

In the light of these facts it is highly probable that the cause of beriberi is a germ, which can be carried from place to place, and when it finds itself in suitable surroundings multiplies and becomes highly poisonous. It does not seem, however, to pass directly from person to person, but some observers are of opinion that it may be conveyed to man by certain kinds of food, especially by damaged rice or uncured rice, which in certain places is liable to be attacked by the germ of beriberi, and from which a toxin or poison is produced. Thus it is not the germ itself, but this poison which, when introduced by some means into human beings, produces a widespread affection of the nerves in a manner somewhat similar to that in which alcohol affects the nervous system. A fact which seems to lend support to this conception of the cause of beriberi is that those who are affected with it begin to recover rapidly when removed from the infected locality, but if allowed to remain there they get worse, as if the surroundings rather than the person were infective and the poison were continually being renewed. A circumstance mentioned by Hirota, which bears this out, is that out of fifty-two infants with beriberi, who were suckled by wet nurses having the same complaint, forty-two recovered at once on being weaned, as if the disease had been caused by a poison imbibed in the milk.

Symptoms.

There are two well-marked types of this disease, although mixed cases are very common, and the symptoms vary very much in their extent and intensity. In "dry beriberi" the poison attacks the nerves which govern muscular movements and the sensitiveness of the skin, so that the patient's thigh- and calf.

muscles are shrunken, flabby, and tender on being squeezed; and there is numbness of the skin, especially over the shin, insteps, sides of the thighs, and perhaps on the arms and body. Thus he fumbles on trying to execute any movement with his hands, such as buttoning or picking up a pin, and he may be unable to do so. If he attempts to walk he shuffles along, or drags his foot; his heart is weak, and he suffers from palpitation and severe attacks of breathlessness and pain in the chest, in one of which he may die; sometimes the larynx is affected, so that he can only speak in a whisper. The general health remains, for the most part, fairly good. In "wet beriberi" the patient is dropsical all over, but there is no albumen in the urine and no disease of the kidney to account for the dropsy. He has a weak heart, as in the other variety, and perhaps some weakness of the muscles also, so that he lies in bed like a log, puffy, bloated, and blue, and can only walk with the greatest difficulty.

The explanation of these symptoms is that the poison in such cases has attacked the nerves which regulate the supply of blood to the different organs of the body. The onset in both varieties of the complaint is either slow or rapid, and it may last only a few days or drag on for months. If the patient be not carried off in a paroxysm of difficult breathing, combined with heart failure, which may happen in even the mildest cases, he eventually gets well, his dropsy disappearing entirely; but usually some heart weakness and wasting of the muscles remain permanently, with or without numbness of the skin. Unfavourable signs are paralysis of the diaphragm and vomiting, which show that the nerves of the heart are affected.

Treatment.

Remove the patient at once from the building or place where the disease was contracted, and place him in a dry locality, with plenty of ventilation and good food. Rice should be avoided as an article of diet, but milk, eggs, and meat should be given freely. If there are signs of heart failure the patient must remain in bed, but in the open air if possible, and tincture of digitalis or strophanthus given in 10-drop doses three times a day. In attacks of difficult breathing give 3 drops of the solution of nitro-glycerine (1 per cent.) every half-hour, and occasional inhalation of capsules of nitrite of amyl and of oxygen. Life may sometimes be saved in alarming cases by "bleeding."

When recovery is in progress it may be aided by suitable muscle-tonics, such as solution of hydrochlorate of strychnine, 5 drops; or Fowler's solution of arsenic, 5 drops three times daily in water. The muscles should be stimulated by electricity and massage, and attention paid by surgical measures to deformities arising from the wasting.

LEPROSY

This historically interesting disease probably had its birthplace in Egypt in epochs of remotest antiquity, but was not introduced into Europe until comparatively recent times. Hippocrates and the early Greek writers of his time, about 460 B.C., give no clear account of it, but the fact of its having been mentioned by Aristotle points to the conjecture that it was introduced into Greece before 300 B.C. In the first century of the present era the disease was clearly described both by Celsus and Aretæus, and during the Middle Ages it spread westwards across Europe, a result often thought to be due to the Crusaders, who may have helped to spread it, but who certainly did not import it, as it was already known in England about the year 950 A.D. In the twelfth and thirteenth centuries leprosy increased to such an alarming extent in England, Italy, and France that lazar-houses were instituted, by which means the disease was almost stamped out in civilised Europe by about the end of the fifteenth century, but it lingered in isolated spots until about the end of the eighteenth century. It is said that the last leper in this country died in 1798. Norway is now the only European country where it is at all common. Leprosy is now considered to be a disease of tropical or subtropical climates. It is distributed widely within those limits, being most common in China and India, less so in Japan, Malay, and the East Indies, tropical America, and the West Indies, and still less common at the Cape and in Australia.

Cause.

The cause of leprosy is a special microbe, the *Bacillus lepræ*, first identified by Hansen, of Bergen, in 1874, in the bodies and discharges of patients; but the disease is not under ordinary conditions contagious, or even transmissible by living in the same house or by contact, and only with extreme difficulty, if at all, can the bacillus be cultivated outside the human body. Moreover, we do not know for certain how the bacillus enters the human body, whether in food, water, or air, or whether through the skin or some accidental abrasion or through the bite of an insect. Age, sex, and occupation have little or no influence on the production of leprosy, nor can climate or hereditary influence play any very important part, as is shown by the fact that of the numerous offspring of 160 lepers who emigrated from Norway to America not one became a leper. Sir Jonathan Hutchinson has suggested that the disease may in some way be connected with the eating of fish in a state of decomposition; he remarks that leprosy is a disease of semi-civilisation, and more common on the sea-coast and in the neighbourhood of great lakes and rivers, and was specially rife in the Middle Ages, when there was a large consumption of salt fish, which formed the principal animal food throughout the winter; and that to-day it is most prevalent among the Chinese, who with their rice habitually consume putrid fish as a condiment.

Whatever may ultimately be discovered in this connection, it is undoubtedly a fact that the disease never arises anywhere except it be introduced from without and by a leper, who therefore must be regarded as a source of danger to the community. But it must also be noted that the disease is very feebly contagious, and would probably be stamped out by partial isolation, scrupulous cleanliness of the persons and houses of those afflicted, and destruction of all clothes and dressings soiled by the discharges, in which myriads of bacilli exist.

There are two well-marked forms of leprosy: (1) the *nodular* or *tubercular* form, in which the disease principally attacks the skin; and (2) the *anæsthetic* or *mutilating* form, in which the nerve trunks are chiefly involved. *Mixed* cases occur in which both these parts are attacked.

Symptoms.

The incubation period is extremely long, probably two or three years at least; the invasion is slow and insidious, characterised by weakness, mental depression, recurrent attacks of feverishness and of profuse sweating. There may also be indigestion, headache, giddiness, itching or tingling of the skin, and neuralgic pains. These symptoms come and go perhaps for months, and then an eruption breaks out on the skin, in the shape of spots and patches, from the size of a millet seed to several inches in diameter, of a reddish brown colour, partly disappearing on pressure, roughly symmetrical, and situated on the outside of the arms and front of the leg and thighs, on the upper part of the face, and on the body. Some of the spots may after a time entirely disappear, but others become darker, pigmented, or whitened, and perhaps a little thickened. A very curious circumstance is that while the hair on the affected patches of skin drops out—as, for instance, the eyebrows—the hairy scalp is never attacked by the eruption. After a very variable time other changes are noticed on the face; the skin under the eyes becomes swollen and puckered and the nose thickened, and in the *nodular* form flat, firm nodules or bosses appear, the size of split peas or beans, often much larger, of a dirty red colour, turning later on to brown or yellow and with a smooth, greasy-looking surface. When these nodules are numerous and join together, the "leonine" expression so characteristic of the disease is produced, the forehead being deeply wrinkled, the eyebrows overhanging and hairless, the nose tumid, and the cheeks irregularly thickened and puckered; the lips hard, swollen, and turned down, the ears enlarged and standing out stiffly from the sides of the head. Later on the same changes occur in other parts of the body, and the nodules soften and form ulcers, which exude sticky, offensive matter. The eyes and larynx also become affected in the same way and are ultimately destroyed, so that the sufferer becomes voiceless, blind, and loathsome.

In the *mutilating* form of leprosy the eruption is usually more marked, resulting in dark red rings enclosing pale skin, in which feeling is lost; or in large water-blisters, from the size of a pea to that of an egg. The eruption may get better or worse, but sooner or later neuralgic pains, tingling, and numbness occur, small nodules can be felt on the nerves, while mortification and mutilation of the fingers and toes may take place. Sensation is completely lost over a large part of the body, the limbs become twisted and deformed, the muscles waste and are partially paralysed.

The average duration of nodular leprosy is about nine years, that of the mutilating form double as long. In both case the health becomes gradually more feeble and the vital powers exhausted, and after years of suffering disease of the lungs or kidneys sets in which carries off the victim.

Treatment.

Europeans who have contracted leprosy in the tropics should be brought home; considerable improvement has often been known to follow the change, or the disease may remain stationary. Sir J. Hutchinson advises the exclusion of *all* fish from the diet. The favourite remedy is chaulmoogra oil, given in doses of 2 to 40 drops three times daily, according to tolerance. The oil should also be rubbed in, and this treatment continued for years, bearing in mind that the disease does not progress uniformly, getting better for a time and then breaking out again. Unna recommends ichthyol in increasing doses, commencing with 3 grains, and Radcliffe-Crocker advocated hypodermic injections of perchloride of mercury, $\frac{1}{5}$ grain, once a week. It appears that iodide of potassium does harm. Danielssen advises salicylate of soda in 15-grain doses four times daily, gradually increasing the dose, and administering at the same time cod-liver oil, quinine and iron. Many other drugs have been tried, but they have all in turn been discredited. The injection of nastin, however, has proved to be of great benefit in some cases.

SUNSTROKE

There are many conditions, some trivial, others very serious, that are due to excessive heat, either from exposure to the direct rays of the sun (*sunstroke* or *insolation*) or to high atmospheric temperature in the shade (*heat stroke*).

The effects of heat are more injurious to those who are debilitated by illness or exhausted by exertion or who are of intemperate habits; they are more felt when the air is damp than when it is dry, for perspiration, the natural means of cooling the body, is thus prevented; they are also exaggerated by the contamination of the air with the products of respiration, as in overcrowded rooms.

Sunstroke.

The first form of sunstroke, which is usually the result of exposure to the direct rays of the sun, chiefly affects the heart, the symptoms being severe faintness and exhaustion. The sight is dim, there is great giddiness, the pulse is feeble, the skin cold and pale, the breathing shallow and sighing, the pupils large, and the temperature below normal. Although some of these cases end fatally, the great majority gradually recover, and the recovery is complete, although for some time there may be a splitting headache and much exhaustion.

The patient, when attacked in this way, should at once be carried to a cool, airy, and shaded place and laid on his back, and any tight clothing about his neck, chest, or abdomen should be loosened. Water should be sprinkled over his face and chest, and smelling salts applied to his nostrils. A teaspoonful of sal volatile or some brandy and water should be given, and will aid in restoring the flagging action of the heart.

Heat Stroke.

The second variety of sunstroke, caused by long-continued exposure to high temperatures or by violent exertion under a hot sun, is more serious, and the symptoms show that the nervous system is the part chiefly affected. The attack may come on suddenly or gradually. The patient may be "struck down," become unconscious, and die rapidly, as if from a severe attack of apoplexy. At other times there may be distinct premonitory symptoms for some hours, or even days, before the attack, such as drowsiness, pains in the limbs, headache, quick, shallow breathing, a feeling of apprehension, a desire to pass water frequently, tightness round the chest, nausea, and even vomiting. These symptoms rapidly grow worse, the face is flushed and red, the pulse rapid, the brain wanders, and violent delirium may set in. Gradually unconsciousness comes on and passes into a state of coma. If the temperature is taken it is found high, sometimes excessively high, and it may be 104°, 106°, or even 110°.

If treatment is not now immediately employed, the condition will end fatally by failure of the respiration or heart, or by the onset of convulsions. Even in those who recover, many serious effects, such as frequent intense headaches, deafness, blindness, paralysis, epilepsy, or even mental derangement, are left behind, which make the sufferer an invalid for life.

To reduce the excessive fever is the most important aim of the treatment. If the patient can swallow, quinine should be given in 5-grain doses every three hours, but nothing is so beneficial as the application of cold. The head should be shaved, and a bag containing pieces of ice applied to it. The body should be wrapped up in a wet sheet, or iced water may be poured in a fine stream from the height of 3 or 4 feet on to the head and spine. A careful watch should be kept on the temperature while these measures are being carried out, and they should be discontinued when it has fallen two or three degrees and the patient be wrapped in blankets, with hot bottles to his feet, to encourage free perspiration. The bowels should be cleared with 3 grains of calomel powder, or with a large soap and water enema. In the later stages a blister may be applied to the nape of the neck, and mustard poultices to the feet and calves.

During recovery the food, which must be light and simple in character, must be given frequently in small quantities, and the patient must be kept absolutely quiet and at rest. As soon as travelling can be permitted, he should move to a cooler climate, especially if any nervous symptoms remain, such as headaches, irritability of temper, loss of memory, or great sensitiveness to a high temperature.

Heat strokes may to a great extent be avoided by reasonable care. The health should receive careful attention, for ill-health is a predisposing cause; all excess must be avoided, whether of food, alcohol, or tobacco. Exposure to the sun must be guarded against, the head, neck, and temples well protected by suitable headgear, and the sleeping and dwelling rooms darkened and cooled during the heat of the day.

CHAPTER XXXIII

TROPICAL DISORDERS (*concluded*)

Snake-bites—Yaws—Madura Foot—Pellagra—Endemic Hæmaturia—Filariasis—Ankylostomiasis—Guinea-Worm—Tropical Skin Diseases—Oriental Sore—Veld Sore—Climatic Bubo—Special Fevers.

SNAKE-BITES

A LARGE number of persons in tropical climates are bitten by venomous snakes, and many deaths are annually due to this cause—about 20,000 in India alone. Although many small snakes are met with in England and other parts of Europe whose bites cause severe symptoms, they are not usually dangerous to life, except in the case of young children. India, Australia, Africa, and parts of North and South America, on the other hand, are infested by many very dangerous species, especially in the hotter districts.

Symptoms.

The symptoms of snake-bite vary much according to the amount of poison injected, the condition of the sufferer's health, and many other factors, but they depend, above all, upon the variety of snake. In this connection it is usual to divide venomous snakes into two classes, the columbrine and the viperine, the former including the cobras and kraits, the latter the vipers and rattlesnakes. Immediately after the bite there is, in most cases, severe pain in the wound, which becomes swollen, red, and inflamed. In the course of from a few minutes to half an hour the general symptoms set in, the length of time being much shortened when the poison has been injected directly into the blood-vessels. In the columbrine class of snakes the poison rapidly causes paralysis, first of the legs, then of other parts, especially of the muscles of respiration. The breathing grows slower and weaker until it ceases, but the consciousness remains unaffected until quite the end. If the patient's strength outlasts the action of the poison, he rapidly recovers his ordinary health.

In the viperine snakes the poison, on the other hand, causes rapid failure of the heart's action and total loss of consciousness, and the patient may die in the course of a few hours in a state of extreme collapse.

Treatment.

The first measure to adopt in treating snake-bite is instantly to tie a band tightly round the part between the bite and the heart, in order to prevent the distribution of the poison in the system. If it be the leg which is bitten, the band should be applied round the thigh; if the arm, round the upper arm; it should be tied as firmly as possible, and should be tightened by passing a stick through it and twisting it. The wound should then be thoroughly cut open and washed with a strong solution of permanganate of potash; the affected structures should be cut out, or, if a finger or toe, immediately amputated. But such measures are hardly possible unless a surgeon is at hand.

For those without skilled assistance a special instrument has been devised by Sir Lauder Brunton. It consists of a lancet covered with a cap sheath, and has a small space at the base in which permanganate of potash crystals are kept in readiness. The whole instrument, including its wooden case, is only about 2½ inches in length, and can be carried in the pocket. It is to be used as follows: A ligature having been placed round the limb, deep incisions must be made with the lancet through the wound caused by the bite, and the crystals, moistened with water, are then rubbed well into the wound as thoroughly and deeply as possible. Permanganate of potash is believed to destroy its own weight of all snake poisons.

A serum (antivenene) has been prepared by Calmette which acts as an antidote to snake poison, but varies according to the species of snake; it should be injected at once, or at any rate within an hour of the infliction of the wound. The patient should be kept quiet and still, cheered and encouraged, and given frequent doses of strong stimulants, such as hot spirit and water, sal-volatile, or solution of ammonia. Hot bottles or mustard poultices should be applied to the heart region, and if the respiration fails artificial respiration should be performed regularly and continuously in the hope that life may be prolonged until the poison has passed out of the body. The inflammation and its results caused by the poison in the bite and its neighbourhood should be treated on ordinary surgical principles.

YAWS

This is a feverish contagious disease very prevalent in some parts of the world, especially in the West Indies, the West Coast of Africa, and in many of the Pacific Islands. It presents some resemblance to syphilis, and, like that disease, is due to a microbe which is styled a spirochæte—the *Spirochæta pertenuis*. The germ is transmitted from the diseased to the healthy, finding an entrance through the broken skin or by the bites of insects. The incubation stage is indefinite and long, varying from two to seven weeks; it is followed by the constitutional symptoms and the characteristic eruption.

Symptoms.

There is more or less fever, which in bad cases may reach 101° or 102°, with rheumatic pains all over, and headache. The lymphatic glands become enlarged and tender. The eruption begins as a crop of pimples, which gradually increase in size up to little lumps ¼ inch or more in diameter; these become split and secrete a mattery discharge, but are neither painful nor tender when touched. When irritated the swellings have the appearance of a raspberry, from which the disease has received its name of frambœsia (French, *framboise*). The discharge forms a scab, which dries and falls off, leaving a purple stain. The health is gradually restored as the eruption disappears, and under favourable circumstances very few cases prove fatal, but in the diseased, debilitated, or maltreated very serious after-effects may be met with, and death may result. The complaint lasts from six weeks to many months, depending much upon the state of general health and the surroundings of the patient, and the treatment.

Treatment.

The patient must be well fed and warmly clothed, whilst all risk of cold must be avoided, or the eruption will be checked. Daily warm baths should be taken, and the action of the skin encouraged by warm drinks and some medicine which promotes perspiration, such as teaspoonful doses of the solution of acetate of ammonia. The eruption may be treated with a lotion containing boracic acid 10 grains, and bicarbonate of soda 15 grains, to the ounce of water, or a weak carbolic acid lotion (1 in 60 of water). When the feet are affected they should be soaked in hot water and the thickened skin removed. A tonic mixture should be administered and continued for a long time, the best drugs being iron and arsenic combined with small doses of iodide of potash. The patients should be isolated, and the infected houses, clothes, and bedding carefully disinfected.

MADURA FOOT

Is a disease caused by a fungus which usually involves the feet, as the name suggests, but is sometimes met with in the hands or even the internal organs. It is most frequently met with in India, but recently it has been described as occurring in many other countries. As usually seen, it begins as a firm swelling in the sole of the foot, which is quite painless. This softens and breaks, discharging an oily fluid containing small greyish or black particles. More swellings follow and discharge, until the foot becomes greatly swollen, enlarged, and deformed. The disease is very prolonged, lasting many years, and may finally cause death by the constant drain on the system. The only cure is the removal of the diseased part by operation, and if this is done thoroughly there is no fear of a return of the malady. Iodide of potash has been found to be beneficial in some cases.

PELLAGRA

This disease, named from the Italian—" rough skin "—was only recognised as recently as the early part of the eighteenth century, but is now known to exist in many countries, both in Europe and elsewhere. It is almost limited to agricultural labourers, both men and women, and is the cause of many deaths. Its cause is still unknown, but many facts point to its being a germ disease; the old belief was that it was caused by eating maize in an unwholesome condition. It first shows itself in the spring, and relapses take place at the same season every year.

Symptoms.

There is a characteristic eruption, much like sunburn, which appears on all those parts of the skin that are uncovered; the skin is red, swollen, and smarting. In autumn the rash disappears, leaving the skin discoloured and roughened. The digestion is much disturbed, and the nervous system shows signs of involvement. There are sleeplessness, giddiness, and intense weakness with depression. The depression gradually passes into melancholia, the weakness into paralysis. Each spring the disease returns with increasing severity, and many a patient drifts into imbecility or mania, and ends his days in an asylum. The illness may drag on for many years.

Treatment.

Such patients should, if possible, be removed to pellagra-free districts and placed under healthy conditions. Arsenic, the one drug which has proved useful, should be given regularly for lengthy periods. When the disease is advanced it is incurable. In Italy the Government has provided means by which maize can be properly prepared for food, better hygienic conditions, and asylums for the treatment of pellagrous patients, and the amount of disease is said to have been diminished by these measures.

ENDEMIC HÆMATURIA

This complaint is commonly met with in all parts of Africa, is especially prevalent in Egypt, and occasionally occurs in many other countries. It is said to be present in half the native population of Egypt. The symptoms are produced by a small worm with a big name—*Schistosomum hæmatobium* or *Bilharzia hæmatobia*—which was discovered by Bilharz in 1851. This parasite enters the body either by the drinking of polluted water or through the skin in bathing, but the exact mode of entrance remains to be proved. It chiefly attacks men who work on the land in the country and children who play in the filthy streets in the towns, but women also are liable to the disease if their habits expose them to the infection. The female worm lays an enormous number of minute oval eggs in the veins of its host, especially in the portal vein—the vein leading to the liver. The eggs pass to various organs, especially the bladder and the rectum, and by the irritation they produce cause the symptoms of the complaint.

Cause.

These are so slight in many cases that they may pass unheeded, but in others they set up much irritation and suffering, and may occasionally cause death from exhaustion or secondary disease of the bladder or kidneys. The most common symptom is the passage of blood in the urine, for the eggs find their way by the blood-vessels into the walls of the bladder, and set up inflammation and destruction of its lining membrane. There is a constant desire to pass water, which act is accompanied with scalding and pain and a feeling as if the bladder is never quite emptied. The water first passed may be clear, but the last, especially the last few drops, are mixed with blood, slime, and the parasites' eggs, the latter being easily seen under a microscope. Stone in the bladder is often developed on the roughened surface of the mucous membrane, and later there may be severe kidney disease from the obstruction to the flow of urine and the spread along the ureter of the inflammatory process. These bladder troubles are increased by over-exertion or improper food. Implication of the bowel is shown by straining, pain, and the passing of much slime, and later by the growth of polypus and by prolapse of its mucous membrane. The disease lasts for years, and in mild cases may interfere but little with the patient's mode of life. It seldom entirely disappears, but in these mild cases the symptoms subside and cause but little trouble.

Symptoms.

The patient must live a quiet life, avoiding the dangers of over-exertion and exposure to cold. His diet must be simple, nutritious,

Treatment.

and unirritating, and when the symptoms are severe or the bleeding free he must remain in bed, keep warm, and drink freely of milk and bland fluids. No drug destroys the worms or hastens the escape of the eggs, but some relief to the symptoms is obtained by taking 15 drops of the liquid extract of male fern three times a day after meals for some ten days at a time. The cystitis also can be benefited by treatment (*see* Vol. I., p. 169). Prevention may be attempted by drinking no unboiled water and eating no uncooked food. The urine and the motions must be disinfected and dried to destroy the parasite, and never thrown into water. Bathing and paddling in dirty or stagnant water in infected localities is dangerous.

FILARIASIS

This term is applied to the diseases produced in the body by the ravages of minute parasitic worms called filariæ, the most important being named after its discoverer, *Filaria bancrofti*.

The filaria exists in all tropical and sub-tropical countries, is introduced into the body by certain varieties of mosquitoes, and finds its

Cause.

way from the bite to the lymphatic vessels. Having arrived there, it sets free a prodigious family of young worms, which pass along the lymphatics to the blood-vessels, and can be found in enormous numbers in the blood. But these little creatures have peculiar habits; they can only be discovered when the blood is examined at night—from five to six o'clock in the evening to eight or nine o'clock in the morning—and are found in greatest numbers at about midnight. In the daytime, according to Sir Patrick Manson, they retire to the large arteries and the lungs. The parasites do not necessarily cause symptoms of disease, but if they block the lymphatic vessels trouble arises.

This may take many forms. The lymphatics may become enormously enlarged and distended, and the flow of lymph impeded.

Symptoms.

The parts from which the lymph ought to be drained become swollen, thickened, and badly nourished. Lymph scrotum is formed in this way, the skin becoming enormously enlarged and covered with numbers of blisters, from which, when pricked, lymph escapes. The lymphatic glands, especially those of the groins, may be much enlarged. If the lymphatic vessels of the bladder or kidneys are obstructed they are liable to burst, and their contents, escaping with the urine, produce the condition called *chyluria*. It is characterised by the passage of white urine, like milk, which contains clots, and there may be much pain and difficulty in voiding it. This condition may continue for days, or perhaps months, and even when it ceases is liable to return. If examined under the microscope the urine is found to contain fat, blood-cells, and the filarial parasites.

Another disease which may be set up is called *elephantiasis*. It consists of an overgrowth of the skin and connective tissue of the affected part, in which the lymph has stagnated in the vessels through blocking of the larger trunks by the filaria worms. Constant attacks of inflammation are set up in the part, with much fever and a condition very like erysipelas. The part grows larger until the leg—if that is the seat of the affection—assumes the appearance of an elephant's (hence the name), or the scrotum—the bag containing the testicles—becomes so enormous as to weigh, it may be, as much as 200 lb.!

Treatment.

To destroy the parasite by treatment is beyond our power. During an attack of chyluria the patient should lie in bed with his hips well raised, should take but little to eat and drink, avoid fatty foods, including milk, and keep his bowels acting with gentle aperients. In elephantiasis great care should be exercised to avoid all causes that may set up inflammation, such as injuries, over-fatigue, or rapid changes of temperature. The growth may be kept in check by rest, raising the part, firm bandaging, and massage. Ultimately, when the parts grow so heavy as to interfere with the patient's movements, removal by operation may be resorted to with careful antiseptic precautions.

To prevent filariasis it is necessary to avoid the bites of mosquitoes by surrounding the bed with mosquito nets, and by other measures described in the treatment of malaria. The conditions pleasing to the mosquito should be removed, such as stagnant pools and rank vegetation. The patient should be regarded as a source of infection, and protected from mosquito bites for the safety of others.

ANKYLOSTOMIASIS

Consists of a severe form of anæmia accompanied with symptoms of indigestion—pain in the pit of the stomach, relieved by food, but increased by pressure, rumbling of wind, perverted appetite, and irregular action of the bowels. If such symptoms are unrelieved by suitable treatment they may grow worse, set up fatty degeneration of the heart and other organs, and even end fatally.

The condition is caused by the entrance with food or water, or more probably through the skin, of an army of minute worms, which work their way into the intestines, where they suck blood and set up irritation. It chiefly affects those who work on the soil, such as miners, workers in coal-fields, tunnel men (a severe epidemic occurred in the making of the St. Gothard Tunnel), and others. The disease can be recognised by finding the minute oval eggs in the evacuations from the bowels under a microscope. The parasite can best be removed from the body by the following mixture, as recommended by Sir Patrick Manson:—

PRESCRIPTION 154

Oil of eucalyptus	30 drops.
Chloroform	45 drops.
Castor oil	10 drachms.

One half to be taken first thing in the morning; the other half 30 minutes later.

The dose must be repeated every other morning until the motions are free from eggs.

The precautionary measures requisite include the prevention of contamination of the drinking water and soil with excrement, by which the poison is spread; the boiling of water before use, the cleansing of the hands before eating, the protection of the feet and legs with shoes and putties, and the careful inspection and treatment of all infected persons.

GUINEA-WORM

This disease especially affects the inhabitants of parts of India and the west coast of Africa; the cases seen in this country have originated in the tropics. The worm is probably introduced into the body in drinking water. From the intestine it works its way to its favourite situations, which are beneath the skin of the legs and the lower part of the body. Here it gradually bores through to the surface, a blister **Symptoms.** forming over the spot. The blister being broken, a sore place is left with a minute hole in its centre, from which the worm may protrude its head. There is constant discharge of a milky fluid, which under the microscope is seen to contain myriads of minute worms. The fluid is discharged in much greater quantity **Treatment.** if the sore be douched with a stream of cold water, and this measure should be regularly carried out to hasten the cure of the disease. It is very dangerous to attempt to withdraw the worm until the white fluid ceases to flow upon the application of the cold douche. If before this the worm is dragged upon it will be torn in two, and the young worms will escape into the limb and set up serious inflammation. After the milky juice ceases to flow, which usually occurs in from 15 to 20 days, the end of the worm should be seized, gently drawn out, and wound on to a wooden match, a little more being wound out once or twice daily. Many of these worms reach to a yard in length.

The protrusion of the worm may be encouraged by applying a cupping glass, or it may be killed by injections with a small hypodermic syringe and a needle of a few drops of a solution of perchloride of mercury (1 grain in 2 ounces of water), either into the worm or in its neighbourhood.

If the worm dies before it has discharged its progeny it will either shrivel up or cause an abscess.

The only preventive measure that is required is to be sure that the drinking water is pure and has not become infected by a patient suffering from the disease.

TROPICAL SKIN DISEASES

The great heat of tropical countries causes extreme activity in the functions of the skin, and makes it liable to many diseases. *Prickly heat* (p. 14) is one of the commonest of these, and is a great source of inconvenience to all Europeans. It is best prevented by careful avoidance of everything that induces perspiration, such as excessive drinking, exercise, and warm clothing. The skin, especially where two surfaces touch one another, should be well dusted after the bath with a powder of equal parts of boracic acid, oxide of zinc, and starch. The spots are relieved by rubbing them with a damp sponge dipped in a powder of sublimed sulphur 80 parts, magnesia 15 parts, and oxide of zinc 5 parts.

Boils, another very common trouble of the tropics, are often predisposed to by a debilitated state of health. The general health must be attended to, and for local treatment the boil must be protected from irritation and friction, the skin frequently washed with perchloride of mercury lotion (1 grain in 2 ounces of water), and great care taken to prevent inoculation of the surrounding parts with the discharge.

Many skin eruptions produced by the growth of fungus are met with in hot climates; some of them are the same affections with which we are familiar in England growing in tropical surroundings. *Dhobie's itch*—so called from the belief that it is caught from clothes sent home from an infected washerman—is really a form of ringworm, which affects the skin in situations where two surfaces come in contact, especially the inner surface of the thigh. The treatment is similar to that of ringworm in general (p. 30), but must be energetic, as the disease is most inveterate.

Contagious pemphigus is a common affection in some tropical places, especially in the hot season. Caused by a germ, it begins as small red spots, which rapidly turn into large blisters; these get broken, and the inflammation gradually subsides. It affects all parts of the body, is very contagious, spreading rapidly through a school, and is transmitted from one part of the body to another by the fingers in scratching. It is treated by washing the affected parts with a weak lotion of perchloride of mercury (1 grain in 2 ounces of water), and then dusting them with a powder of equal parts of boracic acid, oxide of zinc, and starch.

The *chigger* or *sand flea* is the cause of a very troublesome affection of the skin. Its appearance is that of a reddish brown flea, and its habit is to bury itself in the skin of the feet, hands, or other parts, where it causes much irritation and inflammation. It is possible to dig the fleas unbroken out of the bed they have formed in the skin with a clean needle, when the sore spot may be covered with an antiseptic dressing. The trouble may be avoided by cleanliness of the house and person and the free use of insect powder.

ORIENTAL SORE

This is a disease which, under a great variety of names, occurs in many tropical climates. If affects persons of all ages, is very common in children, and involves the healthy as often as the delicate. It is apparently produced by a germ, which can be transmitted from the diseased to the healthy by inoculation, but whether it is always spread in this way, or may find an entrance with food or drink, is not quite certain. Some observers believe it is inoculated by the bites of insects.

Cause.

The malady begins with an inflamed itching spot on some exposed surface of skin; this peels, the surface becomes moist and forms a small scab. This scab, separating, leaves a raw, discharging sore; the sore surface grows larger and deeper, and secretes a thin, offensive mattery fluid, which is liable to dry and form crusts. The pain is sometimes severe. The sore continues for months, but gradually heals, the healing process first showing itself

Symptoms.

at the centre. The final scar is much puckered, and of a bluish brown colour.

Treatment.

The wound should be kept clean and free from crusts by the application of antiseptic lotions, such as boric acid or weak carbolic. Some surgeons scrape away the diseased surface or destroy it with caustics. When the wound begins to heal it should be dressed with boric acid or iodoform ointment. The general health should be maintained by a generous diet and a moderate amount of stimulants and tonics. A change of air is often necessary to complete the cure.

VELD SORE

This affects persons who are in ill-health, and appears most commonly on the back of the forearm, but occasionally on the legs and feet. It is well known to the Boers, and it invalided many of our men during the South African War. It begins as a blister, which breaks and leaves a sore of a very obstinate character. It is caused by a micrococcus, which probably gains entrance through a slight wound or insect bite. To effect a cure the edge of the sore must be thoroughly cut or scraped away in order to remove the disease germs, and it should then be covered with a compress of perchloride of mercury lotion (1 in 1,000) and dressed daily. Good food and tonics aid the cure.

CLIMATIC BUBO

In many widely separated places, all, however, in tropical or subtropical climates, a peculiar enlargement of the glands of the groin is met with, to which this name has been applied. It occasionally occurs in persons visiting the infected areas, such as the crews of warships or merchantmen, but is rarely imported into this country. It is in some way associated with the plague, but its actual cause is at present unknown, and, although it produces disablement, it seldom issues in death. Fever usually accompanies it, with great depression and debility, whilst in many cases the enlarged glands break down in abscesses. As soon as matter has formed, the affected glands should be removed by operation, or the disorder will prove most intractable and extend over weeks. Sometimes, however, the swelling subsides without the development of an abscess, and this result may be promoted by rest in bed, light diet, and the firm pressure of a bandage.

SPECIAL FEVERS

The term " fever " in tropical climates is used as almost synonymous with malaria or ague, but many fevers are met with in the tropics whose nature is little understood, and which are occasionally peculiar to localised areas. The spotted fever of the Rocky Mountains, called also " blue disease " or " black fever," is one which infests the Western American States, especially in the spring months, and is perhaps carried from the burrowing squirrel to man by a variety of " tick." Japanese river fever is another which causes many deaths amongst the labourers on the banks of the rivers in the west of the island of Nippon. Colonel Crombie describes several forms met with in India under the names of simple continued fever, low fever, and non-malarial remittent fever. There are also the " three days' fever of Chitral " and the " seven days' fever of Indian ports.'' The treatment of these varied disorders must be carried out on general principles, for no certain remedy is known. Quinine is valueless. The patient should be put to bed, and given fever diet and a simple fever medicine. A change of air or a sea voyage is often very beneficial.

CHAPTER XXXIV

DISORDERS CAUSED BY FOOD AND DRINK

Deficiency of Food—Scurvy—Excess of Food—Unsuitable Food—Tapeworms—Threadworms — Roundworms — Trichinosis—Alcoholism—Obesity—Fattening the Thin.

In the Health section of this work will be found much information about food, its various forms, the amount required to maintain the body in health and the different means of preparing it for human consumption. Here we are concerned with food as a cause of disease.

This subject is one that occupies an important place in the minds of us all, and the newspapers are constantly calling attention to it. Almost daily it is possible to find in our morning paper some report of disease or death caused by food or drink, until our minds are so filled with the risks we run that we feel it hardly possible to take anything with the full confidence that it can do us no harm. We hear that milk and meat may be infected with tubercle bacilli, that oysters may carry the germ of enteric fever, that beer may contain poisonous doses of arsenic, that tomatoes produce cancer (!), that many foods contain boric acid and other preservatives that are injurious to health, and that water itself may convey into our bodies all sorts of serious complaints—until we almost feel that we must either go without nourishment altogether or treat science as a subject to be ignored.

There is, of course, something to be said for these alarmist views, but the danger of unwholesome food is much exaggerated in our minds by taking each accidental case of disease produced in this way as a sign of general danger, and there are some very encouraging facts which will help to reassure us. First of all, much is done by the action of the law to ensure a healthy food supply to the community; secondly, in the process of cooking many injurious ingredients are destroyed; and, thirdly, the gastric juice has a preservative and antiseptic power, and renders many poisonous substances perfectly innocuous.

DEFICIENCY OF FOOD

Starvation is occasionally met with among the very poor from absolute absence of the necessaries of life, and among those who, though well provided with the good things of this life, are yet prevented by disease from taking any nourishment. Starvation due to the former cause is so intimately mixed up with the other accompaniments of poverty, such as want of clothing and fuel, exposure to weather, and overcrowded and filthy surroundings, that it is difficult to decide which of the symptoms of disease are attributable to it and which to the accompanying circumstances.

It must be treated with great care, and both food and drink given in small quantities at first; if the sufferer is allowed to take food and drink as freely as he desires, severe symptoms or even death may be the result. Small quantities of light, warm food, such as beef-tea or milk, should be given, and the patient should be kept lying down and thoroughly warm.

In the compulsory fasting due to inability to take food, the symptoms are very definite—uneasiness and sinking at the pit of the stomach, with an insatiable thirst, which is most distressing if no fluids can be taken. With these there is a rapid loss of weight and strength, failure of mental power, and an extreme depression of the body heat, the last being the chief cause of death. The treatment of this condition must, of course, depend upon the disease causing it—whether obstruction of the gullet or acute disease of the stomach, but for a time death may be warded off by the administration of food by the bowel in the form of nutrient injections.

The natural diet for humanity is a mixed one, formed in varying proportions of all the classes of food-stuffs; and the entire absence or extreme diminution of any one class produces symptoms of ill-health. If water is taken in very small quantities the digestion suffers, the various juices and secretions of the body are scanty and concentrated, and health fails accordingly. If common salt be absent from the food an unhealthy state is set up; the blood becomes thicker and clots with greater rapidity, and dangerous consequences may ensue.

SCURVY

The one definite disease caused by the absence of a special class of food-stuffs is scurvy. This is produced by a deficiency for any length of time of fresh vegetables in the diet. It used to be the cause of thousands of deaths on board ships which went for long voyages and were unable to obtain fresh vegetables on the way; sometimes half the crew would be carried off by this dread malady. But now the disease is almost a curiosity, for, its cause having once been discovered, its prevention was simple. And when met with at all, it is the result of war, famine, shipwreck, or carelessness.

Symptoms.

The complexion becomes dull and sallow; the gums swollen and liable to bleed; the teeth loose and tending to fall out; the bowels obstinately constipated; the breath offensive; and the body excessively wasted and weakened. Spots and swellings, purple in colour, appear, due to hæmorrhage under the skin or other parts, and bruising is produced by the slightest injury.

Treatment.

The treatment is simple and efficacious, and nowadays the disease seldom causes death. The patient must be kept at rest, and carefully fed with light diet, of which fresh vegetables and fruit form an important part. Lime-juice and lemon-juice are also useful. They were supposed to cure the disease by themselves, but are not so efficacious as when combined with fresh vegetables.

EXCESS OF FOOD

We much more frequently meet with disease produced by excess than by deficiency of food. It is quite a common error among people in this country to eat more (especially of meat and nitrogenous or flesh-forming food generally) than the body requires to maintain it in a state of healthy nutrition. In the days of our forefathers the amount of food eaten and of beer and wine drunk was far greater than it is at the present time, and yet they lived as long and as healthily as we do; but, on the other hand, they probably took much more exercise, and lived more in the open air. In the case of those who lead sedentary lives, the digestion fails to assimilate much of the food taken, which passes off unused, and therefore wasted, but in doing so is liable to set up dyspeptic troubles, with constipation or diarrhœa. The excess of material taken up by the digestive organs produces fat, which loads the body generally and the internal organs; it also produces a full-blooded condition or plethora, disturbs the functions of the liver and kidneys, and poisons the blood with effete materials closely connected with uric acid.

The symptoms produced by this accumulation of waste products are those which are characteristic of gout, and it requires but a slight exciting cause to bring about a sharp attack of that painful malady.

The amount of food required by the body varies according to circumstances. The young and active need more than the old, the sedentary and the brain worker; the cold of winter calls for more nourishment than the heat of summer, and the active summer holiday more than the routine life of the rest of the year. Those who have lived long have generally lived frugally, and centenarians are usually spare people who have both eaten and drunk with moderation and self-control all their lives.

Symptoms.

What, then, are the symptoms of excess of food? A general feeling of lassitude; frequent headaches; constipation or diarrhœa; scanty urine, which grows thick on cooling, and deposits a brick-dust sediment; skin eruptions, especially acne; and general debility and weak circulation. If these signs of approaching trouble be neglected, they will soon be followed by sick headaches and bilious attacks, and finally by more definite gouty affections; the body also, full as it is of effete material, is ready for illness, is prone to receive serious injury from exposure to cold, and is unfitted to withstand the attacks of disease.

The treatment of this condition includes reduction of food, increased amount of exercise, and a diet limited in the same directions as that recommended for gout.

UNSUITABLE FOOD

As we have said, the quantity and quality of food required to maintain health vary according to circumstances, and what is unsuitable in the case of one individual may be perfectly good for another.

An infant cannot digest any starchy food, for its saliva does not contain the necessary digestive elements, but an adult will not maintain his health if starchy foods, the chief office of which is to supply heat, do not form a part of his diet. A gouty, old, or sedentary person must take nitrogenous (flesh-forming) food in small amount; an athlete or farm labourer may take it freely. Idiosyncrasy must also be considered, for what one man can take with impunity may act as a poison on another.

In certain stages of decomposition meat contains active poisons, called ptomaines; these may be taken into the body when eating high game or tainted meat, and occasionally they are present in stale fish, mussels, or bad sausages. Sometimes these poisons produce no harm whatever; at others they cause violent vomiting, purging, collapse, and even death. At present it is impossible to say why they vary so in their action, but the explanation probably is that in healthy states of the digestion the poisons are destroyed or neutralised by the active ingredients of the digestive juices. It is an interesting fact in physiology that during the processes of digestion the nitrogenous constituents of our food are split up into substances which are active poisons and would cause most dangerous symptoms if introduced directly into the blood; they are, in fact, in many respects similar in constitution to the ptomaines we have been discussing. In chronic constipation, too, these poisonous substances are liable to be absorbed from the bowel in sufficient quantity to do actual harm and cause definite symptoms of illness.

Ptomaines.

Animal foods are not alone in this noxious power, for rotten and over-ripe vegetables and fruits produce serious symptoms when eaten, such as acute attacks of diarrhœa and vomiting.

Besides the chemical poisons contained in food, meat may be infected with animal poisons or parasites, which after entering the body develop symptoms of disease.

The chief varieties of worms which inhabit the intestines of human beings are tapeworms, threadworms, and roundworms.

TAPEWORMS

Tapeworms are introduced into the human body by eating flesh of the pig or ox which is infested with the parasite, and which has been imperfectly cooked. The parasite occurs in the meat of these animals in quite a different condition from that which it assumes in the human alimentary canal: it exists in the form of a small bladder-shaped body, which remains fixed in one situation; whilst after it has taken up its abode in the human intestine it develops into a long, flat worm many feet, or even yards, in length. There are two chief varieties.

The symptoms are somewhat indefinite, and may, indeed, be absent, and it is said that the Abyssinians regard freedom from the parasite as a disaster. There are usually digestive troubles, stomachache, diarrhœa, or constipation, and often extreme loss of flesh and general

Symptoms.

debility. In some cases also there are nervous symptoms, as headache, sleeplessness, itching at the nose and anus, convulsions, and even paralysis, all of which disappear when the worm is evacuated. The only certain means of recognising the presence of a tapeworm is to see the segments of the creature in the motions, and the only way to decide positively that it has been entirely removed by treatment is to discover its smallest extremity or head.

Treatment.

The treatment to destroy a tapeworm and remove it from the body is as follows: One to four capsules of liquid extract of male fern should be taken at bedtime (the dose depending on the age of the patient), and a tablespoonful of castor oil in the morning. The former kills the worm and the latter carries it out of the body. If the case is an obstinate one, the dose of male fern should be preceded, as well as followed, by a dose of castor oil.

Another most useful worm-killer is pomegranate root bark; 8 grains of pelletierine tannate in a cachet should be taken the first thing in the morning, and should be followed in two hours by 1 ounce of castor oil. The motions should be carefully examined for the head, for until this has been passed uncertainty as to the result must still be felt.

The cystic form of another variety of tapeworm occurs in man, and is introduced with food which has been improperly cleaned and is uncooked; it forms the disease called *hydatid cyst*, and affects the liver and other organs.

THREADWORMS

A common disease of childhood is threadworms, but it is also met with in adults. The worms inhabit the large bowel, and are in appearance like little bits of thread or thick cotton; when seen in a freshly passed evacuation they exhibit active movements, but they soon die, and are then not so easy to recognise. The minute eggs of this animal find admission to the body on unwashed fruit and raw vegetables; they are hatched in the stomach, and pass along the small intestine to their habitat in the large bowel; from here they wander and constantly escape through the anus; by want of cleanliness, especially in children, they are again carried on the fingers to the mouth, and a fresh brood is introduced.

The symptoms are many and various, heat and irritation about the orifice of the bowel being one of the most common; itchings at the nose, restlessness, and irritability soon follow, and if the parasites are not destroyed, spasms, St. Vitus's dance, and convulsions may be set up. Digestive troubles are frequent, the appetite is uncertain or excessive, stomachache is common, the bowels are irregular, and mucus or blood appears in the stools. Children often cry out or grind their teeth in their sleep and wake in terror. Cough (quite apart from any affection of the respiratory organs), vomiting, and hiccough are also sometimes caused by these worms.

Symptoms.

Treatment is sometimes most troublesome, and the best means to remove these little parasites is a careful course of purgatives, the most effectual being the mineral waters of Friedrichshall, Hunyadi, and Apenta. This purgative treatment should be combined with a mixture containing steel or the tincture of the perchloride of iron, 3 or 4 drops for a child and 10 drops for an adult, three times a day.

Treatment.

Santonin is also a useful threadworm killer; it may be obtained in tablet or lozenge form, or may be made into a mixture combined with castor oil. A 1-grain lozenge may be taken every night for two or three nights, and then followed by an early-morning aperient. The mixture recommended for roundworms may also be used.

Large injections into the bowel of a pint or more of warm water, with a tablespoonful of salt or 3 to 4 ounces of infusion of quassia added to each pint, may be given every other night for a week to assist the other treatment.

Regular washing of the skin around the anus and great general cleanliness are necessary.

For *prevention* it is requisite to avoid all raw fruit and vegetables. and the drinking water should be above suspicion.

ROUNDWORMS

Roundworms inhabit the small intestine, and are in appearance much like ordinary earthworms. The disease is not very common in England, and in most cases only a single worm is present; but abroad, in China, India, Central America, Holland, Portugal, and many other countries, it is of common occurrence, and many hundreds of worms may occur in a single patient, their length varying from 4 to 14 inches.

Symptoms.

The symptoms, similar to those caused by threadworms, but more severe, are colicky and shooting pains in the abdomen, especially about the navel, with indigestion, nausea, vomiting, and diarrhœa ; itching of the nose, with other nervous troubles, such as restlessness, twitchings during sleep, and convulsions. Inflammation of the bowels is occasionally produced by the irritation of the movements of the worms, and the parasites are liable to wander from the bowel into many strange situations, one of the most common being the bile duct. The only way to be quite certain that worms are the cause of the symptoms which trouble the patient is to see one of them in the evacuations. Under appropriate treatment they are expelled from the body, and all the symptoms disappear.

Treatment.

For treatment we must use the drug called santonin, which kills the worms, and follow this up with a good purge to remove them from the bowel.

For a child a 2-grain tablet should be given twice a day for two days, and each should be followed with a dessertspoonful of castor oil, or a 2-grain powder may be mixed with sugar and sprinkled on bread-and-butter and the oil given after it has been eaten.

The following mixture is suitable for a child from six to twelve years of age :—

PRESCRIPTION 155.

Santonin in powder	4 grains.
Castor oil	3 drachms.

Mix together and emulsify with

Mucilage of acacia	4 drachms.
Syrup	1 drachm.

Peppermint water to 1½ ounces.

This should be taken the first thing in the morning on an empty stomach.

For an adult a single dose of 5 grains of santonin early in the morning for three mornings, and a good aperient dose after each (castor oil being as suitable as any), will in the great majority of cases work a cure. Large doses of santonin, and sometimes even those recommended, will produce symptoms which may cause the patient unnecessary alarm ; these are interference with the sight, everything looking yellow or reddish, and a deep yellow or red staining of the urine. With the doses we have advised these troubles are transitory and unimportant.

TRICHINOSIS

The "fleshworm" disease is produced by a minute worm or parasite, the *Trichina spiralis*, and affects man and the pig, rabbit, ox and other animals. If the imperfectly cooked flesh of any of these animals in which the disease exists is eaten by man, the little worms are set free in the intestines, and their young, which are produced in hundreds and thousands, work their way through the intestines into the muscles in all parts of the body, and there coil themselves up, become surrounded with a sheath, and remain permanently. The disease, which was only recognised in 1860, is not common in England, is more so in America, but is most common in Germany, where it is the custom to eat pork in the form of smoked ham, or uncooked in sausages.

Symptoms.

A few hours after the meal, symptoms of indigestion set in: nausea, vomiting, giddiness, and fever; diarrhœa is common, and the patient feels very ill. About a week later, the worms having wandered from the bowel into the muscles all over the body, these become painful and tender to the touch, and pain is felt on moving the limbs. The pulse is quick, the breathing hurried and shallow, and the temperature high; the patient grows irritable and sleepless, and in bad cases becomes dangerously ill and prostrate. Death sometimes occurs in the third or fourth week from exhaustion, irritation of the bowels, or pneumonia, and in some epidemics as many as a fourth of the cases prove fatal. If the patient survives, the symptoms gradually abate and convalescence sets in; the parasites settle down in their new home, and remain at rest in the various muscles and organs of the body, three or four months being occupied in the process.

Treatment.

To be of any use, treatment must be immediate. An emetic will remove the poison from the stomach, and brisk purges will discharge it from the bowels. A good dose of mustard and water and a black draught can be recommended. When once the worm has escaped from the intestine into the body, nothing can be done in the way of cure, and the patient's strength and appetite must be maintained with good food and stimulants until the danger is past.

Preventive treatment consists in well cooking animal food, for in this process the parasite is destroyed.

ALCOHOLISM

The question of the use of alcohol and its value has given rise to an immense amount of discussion, and people are divided into three camps: (1) those who consider alcohol as a poison in all circumstances; (2) those who fly to it as a panacea for all ills, and would advise it in health and in all forms of disease; and (3) those who consider it a most valuable drug in illness, and a luxury to be indulged in with the greatest moderation in health.

Alcohol may be considered as, in a limited sense, a food; it is burnt up in the body like a food, sets free energy, and does work; it also limits the destruction of other foods in the body, and in this way takes their place. But although a food, it is not a suitable food for healthy persons, though in illness it is often of the utmost value. Alcohol is also a drug, and is one of the most valuable stimulants that we possess, being more generally useful than such stimulants as ether or ammonia. We need not discuss this subject at greater length; for although what we have said of alcohol is true when it is taken in moderation and at the right time, there is no doubt that it is a poison, and a very virulent one, when taken in excess.

In considering the effects of alcohol on the body, we shall divide the subject into three parts: (1) the effect of taking a large quantity at once, or acute alcoholism; (2) the effect of taking smaller quantities habitually, or chronic alcoholism; and (3) the nervous disease produced at times by either of these, delirium tremens.

Acute Alcoholism.

1. Acute alcoholism or drunkenness is too often seen in the public thoroughfares to require a detailed description. We witness only too frequently the unsteady and rolling gait, the noisy and incoherent speech, the excitable or sleepy mental condition. The poison affects the mental powers and the muscles; the thoughts are confused, the muscular movements irregular and uncertain, and the speech confused and unintelligible; and, finally, the condition terminates in a heavy semi-conscious slumber.

Treatment.

The treatment of drunkenness varies with the condition of the individual. If he is only heavy and stupid it is well to let him go to sleep until the effects of his indulgence have passed off, covering him up well and keeping him warm, as the effects of cold are severely felt in this condition. If the alcohol has been but recently taken and unconsciousness is growing more profound, so that it is impossible to wake the patient even by shouting, the state of things is more serious. It would then be best to give an emetic if it can be swallowed, so as to empty the stomach of any remaining alcohol; cold water should be poured over the head, hot bottles put to the feet, and the feet and legs should be well rubbed. Finally, it may be necessary to use the electric battery to stir up the patient and arouse him from his lethargy.

After a debauch many uncomfortable symptoms may be experienced: there may be pain in the pit of the stomach, vomiting, retching, headache, giddiness, furred tongue, loss of appetite, great thirst, sallow complexion, great depression of spirits, and general lassitude. These require a good purge, simple diet, abstinence from alcohol, exercise in the open air, and some such pick-me-up as the following:

PRESCRIPTION 156

Tincture of nux vomica	80 drops.
Compound tincture of cardamoms	2 drachms.
Sal volatile	½ ounce.
Tincture of capsicum	24 drops.

Infusion of gentian to 8 ounces.

An eighth part to be taken 3 or 4 times a day.

Chronic Alcoholism.

2. Chronic alcoholism is the state produced by habitual indulgence in alcoholic drinks—the dram-drinker's habit. Inheritance is strongly shown in this condition, but in many cases it is gradually drifted into, almost unconsciously; the habit, begun for depression or illness, becomes confirmed, and "nipping" is indulged in upon the slightest excuse. Occupation is a great predisposing cause, for the temptation is much greater in those who are constantly coming in contact with intoxicants. Many persons still seem to think it impossible to settle a business matter or entertain a friend without a drink, and it is hardly surprising that such should fall victims to this habit. An habitual tippler is an object of pity as well as of disgust: he becomes uncertain and untrustworthy; his muscles tremble; his hands, lips, and tongue shake; his sleep is disturbed and filled with unpleasant dreams; he has noises in his ears; is heavy, headachy and giddy; loses his appetite, especially for breakfast; has morning retching on first getting up, relaxed bowels, foul breath tainted with alcohol, watery

eyes, and swollen spotty face. Almost every organ of the body suffers from the intensely irritating effect of the poison thus constantly imbibed. Its action on the brain produces imbecility and loss of will-power, delusions and paralysis; in the liver, kidneys, and stomach it produces chronic inflammation and loss of function, until the health deteriorates and the victim sinks into his grave in misery.

The treatment of an habitual drunkard is not hopeful, but so long as he retains any power of will and determination something may be done to induce him to give up his habit.

Treatment.

In those whose organs are not already diseased, and who have not carried the habit to excess for any length of time, it is wisest to stop entirely and at once all alcoholic drink. In such this is perfectly safe, and is the only successful course to pursue. If the opposite conditions exist, the use of stimulants must be more gradually checked, as the sudden abstinence may prove disastrous. Many methods of treatment have been tried, and probably all have proved successful in some cases. Hypnotism, the gold cure, the Normyl treatment, and many other plans have all some successes to record, for anything which gives the patient's will some strong stimulus, or in which he places great faith, may strengthen him in his determination to abstain. Isolation and supervision in a retreat specially arranged for the purpose is often successful, and this method can be carried out under the Habitual Drunkards Acts of 1879 and 1898. By the former an habitual drunkard may place himself under restraint in a licensed retreat for a period of twelve months. His application for admission must be made to the owner of the retreat, his signature must be attested by two Justices of the Peace, and must be accompanied by a declaration of two persons who know him to be a confirmed drunkard. During his detention he is under control, and if he is disobedient or refuses to conform to the rules of the establishment he may be sent to prison, and anyone who supplies him with any intoxicant, sedative or stimulant drugs may be fined £20.

By the later of these Acts criminals whose offences may be traced to drink, that is, "habitual drunkards," may be sentenced to three years' detention in a State inebriate reformatory. Unfortunately, no power of compulsion can be exercised over habitual drunkards unless they render themselves subject to the law. In 1902 Parliament adopted the "black list" provision, prohibiting publicans from supplying notified drunkards with drink.

Delirium Tremens.

3. Delirium tremens, popularly abbreviated to "D.T.," is a crisis which arises in a long course of excessive drinking. It may be brought on by a heavy drinking bout, by prolonged abstinence from food, by mental distress, by a severe accident or operation, or acute disease.

Symptoms.

The initial symptoms are loss of appetite, with anxiety and restlessness in the day and sleeplessness at night. If the patient does drop off to sleep, he is disturbed by distressing dreams and imaginations; he wakes with sudden frights, and his mind is filled with terrors; he sees mice or blackbeetles creeping around him, but constantly avoiding his clutches. He becomes suspicious of everybody and everything; hears noises, voices, mysterious whisperings; wanders about the room searching in corners, under the bed, anywhere that could or could not hide an imaginary foe; grows quarrelsome, talkative, and much occupied with his business, and finally may become violent, suicidal or rave like a maniac. The great danger lies in exhaustion, which may rapidly come on, the mania passing into unconsciousness and death.

Treatment.

Treatment must be chiefly directed to maintaining the strength with light nourishing food, such as milk foods of all sorts, beef-tea, and eggs beaten up with milk. A good purgative should be given at the commencement to clear the bowels. The room should be darkened, the patient kept quiet under the constant supervision of a suitable nurse, and all risk of his injuring himself guarded against. The attack lasts from three to seven days, and little can be done to shorten it, but as sleeplessness is a most troublesome symptom some sedative drug is usually necessary; 30 grains of bromide of potash, or 15 grains of hydrate of chloral, or a teaspoonful of Bromidia, should be given, and repeated every hour or two, until sleep is obtained; and very often after a good long refreshing slumber the patient may wake up weak and ill, but quite himself again. In some cases laudanum, 20 drops, is found more efficacious than the preceding drugs, but none of them should be employed unless absolutely necessary.

Alcohol should be avoided when possible, but sometimes it is found that a dose of brandy or whisky or a glass of stout produces sleep when narcotics have failed. With very violent patients restraint is sometimes necessary, but with a good nurse or male attendant this may be avoided, and it is far better to avoid it if possible. During convalescence tonics are required—a mixture like that recommended for chronic alcoholism, followed by quinine and other drugs, and moral influence must be exercised to prevent a return to old evil habits.

OBESITY

Is not necessarily a sign of disease and may indeed be a proof of health, for fat deposited in the body denotes an active condition of the digestive organs. But it must be looked upon as a disease if it exists to such an extent as to interfere with the health, usefulness and comfort of the individual.

Causes.

The causes of obesity are many. One of the commonest is an hereditary tendency; some persons, in spite of active habits and small appetites, grow uncomfortably fat, and in such cases the condition is very difficult to prevent and cure. It is met with at all ages, but most commonly both in men and women after the age of forty, for it is then that men grow more sedentary in their habits, and enjoy more the pleasures of the table, and women develop this peculiar tendency in connection with the change of life. In the active years of early adult life and in old age obesity is uncommon.

Besides inheritance and sedentary habits, the most usual cause of this complaint is to be found in food and drink. A diet containing an excessive amount of fatty and oily substances, and of articles convertible in the body into fat, such as sugary and starchy foods, will rapidly produce a large formation of fat in the body, if these foods are indulged in to a greater extent than is required for the maintenance of the body in health, and to balance the daily waste of the tissues. Malt liquors, sweet beer and stout are most conducive to this condition, and sweet heavy wines have the same effect.

Symptoms.

Many symptoms and troubles afflict the over-fat. They are slow and heavy in mind and body, and often good-tempered to a fault. "Laugh and grow fat" is a proverb, and probably anyone who could always laugh and never worry would prove its truth. Obese persons suffer from palpitation on the slightest exertion, catch cold easily, suffer from diarrhœa and indigestion, and are bad subjects to go through an operation or a severe accident. Their hearts are often weak from accumulation of fat around them and in their muscular structure, and they are frequently gouty.

Treatment.

Having described the causes one can easily recognise the treatment of this complaint, for it consists in their avoidance, but it must be carried out with caution, so that while the fat is being reduced the health and strength do not suffer. Harm is undoubtedly caused by following various fads and fancies. It is commonly believed that acids and especially vinegar are thinning, and this is true, but only if they are taken in such large quantities that the digestion is destroyed and the health damaged. Another popular method is the consumption of soaps and alkalies; this is certainly less likely to do harm, but prolonged use is often prejudicial. The following *régime*, if carried out with ordinary intelligence, can do no harm. The patient should live an active life, with plenty of occupation and not too long hours of sleep, and should take as vigorous exercise as his condition allows. Cycling, riding, and fencing are useful, but there is the great difficulty that so many of these patients can take no exercise. It is all very well to tell an obese person that active exercise is good, and will bring about a cure, but it is often impossible for the very fat to take this advice; their muscles are too weak to enable them to do anything at all active; riding is difficult, fencing absurd, and cycling quite too ridiculous. Now for these persons massage must be employed, and this will to a great extent take the place of exercise. The bowels must be kept free with well regulated purges, and the skin active with occasional Turkish baths.

The diet must be limited, but short, of course, of starvation. The carbohydrate articles of food, that is the starches and sugars, must be cut off altogether, and the fats much reduced. Such limitation leaves the patient only nitrogenous food and green vegetables, but as this makes the diet too restricted for most, certain comparatively harmless starchy foods are generally allowed.

The patient may take clear soups in small quantity, fish, lean meat, eggs, fruit, green vegetables; stale bread, toast, rusks and biscuits, in great moderation; skimmed milk diluted with mineral or plain water; tea and coffee without sugar; light dry wines and spirit in moderation.

He is forbidden thick soups, fatty fishes such as eels, mackerel, salmon, herrings, sardines in oil; pork, duck, goose; rice, tapioca, macaroni, oatmeal, sago, arrowroot, potatoes, peas, beans, parsnips, carrots, beetroot; pastry, sweets and sugar; sweet cocoa, cream, milk, butter; ale, porter and stout.

This diet was developed into a system in 1863 by Mr. Banting, who had himself been cured by it of troublesome obesity. The system is as follows :—

"Bantingism."

Breakfast at 8 to 9 o'clock ; 5 to 6 ounces of meat or fish, or a couple of eggs, a little biscuit or dry toast (6 or 7 ounces of solids in all), and a breakfastcupful of tea or coffee, without either milk or sugar (9 ounces of liquid).

Dinner at 1 to 2 o'clock ; 5 or 6 ounces of fish (not salmon, herrings, or eels), or meat (except pork), poultry or game ; vegetables (except potatoes, parsnips, beetroot, turnips, or carrots), a slice of dry toast, cooked fruit without sugar, dry sherry, 2 glasses ; or claret or madeira, 3 glasses (no champagne, port or beer). This meal consists of 10 to 12 ounces of solids and less than ½ pint of liquids.

Tea at 5 or 6 o'clock ; 2 or 3 ounces of cooked fruit, a rusk or two, and a cup of tea without milk or sugar.

Supper at 9 o'clock ; 3 or 4 ounces of meat or fish with a glass or two of claret or sherry and water (6 or 7 ounces).

A nightcap when inclination directs, a tumbler of grog—gin, whisky or brandy—without sugar, or a glass or two of claret or sherry.

This diet is too restricted for many a fat person ; it should not be attempted without a physician's advice. Another danger from this system is that it leads to a great accumulation in the body of the waste products of nitrogenous foods, and may produce ill effects in this way. To overcome this difficulty a modified diet has been introduced by Dr. Salisbury of New York, for "the various diseases produced by unhealthy and indiscreet feeding." This consists of two-thirds lean meat and one-third vegetables, with large quantities of hot water. The meals may consist of beef, mutton, lamb, without fat, roast or broiled and fairly well cooked ; fish broiled or boiled, oysters ; chicken, game and eggs ; salt, pepper, Worcester sauce, chutney and celery in moderation, and later, when good results have been obtained, green vegetables. The water should be taken as hot as the patient can drink it, a pint when dressing in the morning, a pint before lunch, a pint before dinner, and a pint when going to bed ; it should be slowly sipped, taking 5 to 15 minutes. At meals 5 to 8 ounces only of fluid is allowed.

Salisbury Diet.

The body should be washed twice daily with soap and water, and afterwards rubbed with equal parts of glycerine and water ; regular exercise should be taken ; massage is recommended, and general hygienic rules must receive attention.

FATTENING THE THIN

Some persons are naturally thin even in robust health, but when this condition is a stage in the process of wasting or emaciation it is a sign of disease, and to treat it with success we must discover the cause. Each cause will require its appropriate treatment, but in this place we are only considering the proper means to combat the condition of thinness apart from any recognisable disease.

Treatment.

We must prevent excessive waste of the body produced by anxiety, worry, overwork, over-exercise, over-amusement and unhealthy habits, and put the patient on a diet which supplies fat-producing foods in abundance. Such a diet includes fatty articles such as milk, cream, butter, cod liver oil, vegetables, puddings, and sweets, with beer, stout and port wine. The meals must be taken leisurely, and as much food eaten as the digestion can bear, and it should be taken oftener than usual, an extra "feed" being introduced between the customary meals. The treatment has been formed into a system by Dr. Weir-Mitchell, the patient being put to bed, overfed and massaged regularly, the massage taking the place of exercise and keeping the excreting organs up to their duties. This system will be described in a later chapter under the name of rest cure.

CHAPTER XXXV

HOW DISEASE IS CAUSED

Importance of a Knowledge of the Causes of Disease—Predisposing Causes: Heredity; Sex; Age; Temperament; Climate; Soils; Town and Country; Occupation; Previous Disease; Hygienic Defects—Exciting Causes: Germs; Parasites; Cold; Heat; Poisons; Injuries and Accidents.

HAVING now discussed the chief disorders to which mankind is liable, we shall close the first Part of our work with chapters dealing generally with the causes of disease, and the methods of detecting and treating it, reserving for other Parts the disorders that specially assail children, and those that call for simple surgical treatment.

Considering in the first place, then, the etiology—that is the knowledge of the cause of diseases—we have to point out that there is no branch of medical science that has made greater progress than this. In days of old an enormous amount of superstition, combined with an enormous amount of ignorance, was displayed in connection with this subject. Doctors gave much consideration to the question whether the patient was bewitched. They had also to consult the stars, and find out the influence of his nativity, and his horoscope; it was necessary to "purge the lungs, when Jupiter is weak"; and even to the present day our words are tinged with astrological meaning when we speak of temperaments as jovial, saturnine, or mercurial.

But now our great aim is to discover the definite cause of each disease. Nor is this question by any means a matter of mere curiosity, but rather of the very greatest importance, for it is not until the cause of a disease is discovered that we are in a position intelligently to treat it. Of this several illustrations have been given in the Introduction.

In acquainting ourselves with the treatment of the diseases dealt with in this work, we must have been struck at finding how frequently the remarks occur, "It is necessary to treat the cause," or "The method of treatment depends upon the cause." We shall, therefore, at the outset consider the various conditions which are the causes of disease, feeling that it is a matter of real importance to make ourselves acquainted with them, if we are to treat the disease itself with any measure of success.

We divide the various causes of disease into two great classes, which we call *predisposing* and *exciting*, and we shall first deal with

PREDISPOSING CAUSES

The predisposing causes are those which render an individual peculiarly liable to fall a victim to illness when he comes under the influence of the exciting cause. For instance, a number of persons are admitted to the room of someone who is suffering from influenza. Some of them "catch" the complaint, others do not. What is the meaning of this? It must simply mean that those who took the disease were predisposed to it by their state of health at the time of exposure to infection, whilst those who remained well were free from this predisposition.

Again, a number of persons are exposed to a severe storm and get chilled and wet. Some do not suffer in any way. One gets a bad cold in the head, another an attack of bronchitis, another pneumonia, another inflammation of the stomach, another jaundice, another inflammation of the kidneys, and another an attack of gout. How are we to explain such different results? Only by the hypothesis that different predispositions affected the various members of the party, that some weakness in the part affected or some peculiar condition of the body existed, which rendered one organ more vulnerable than another to the attack of the exciting cause. If we were well acquainted with the life-history of these persons we might discover the various predisposing causes, which would explain what otherwise appears mysterious.

To take another example. Some friends dine together "not wisely but too well." One of them is none the worse for his indulgence, a second has a bad attack of indigestion which gives him a sleepless night, a third has a severe fit which causes him much alarm, a fourth has an attack of gout and is confined to his bed for days, a fifth gets a spasm of asthma, whilst a sixth suffers severely from diarrhœa. In this instance a too free indulgence in the pleasures of the table acts upon a number of people and yet the results are widely different, and the only explanation that we can give is that those results are dependent upon constitutional conditions and upon the various individual predispositions.

What, then, are the predisposing causes of disease which prepare an individual for illness and render him more susceptible than otherwise he would be?

Heredity.

The first which we will consider is heredity, or the predisposition to disease which is the result of inheritance. It is rather alarming at first sight to feel that in spite of ourselves we are born with certain tendencies to disease. But in most cases it is the predisposition or tendency only that is inherited, and not the disease itself, and, fortunately, these predispositions are not so active or so powerful but that we can neutralise them by strict attention to the laws of health.

It is but natural that children who are born so like their parents in features and general appearance as to be the "very image" of them, should have constitutions and tendencies like them also. The diseases which may be inherited are many, and the peculiar constitution which some of them produce is called a *diathesis*. If, for instance, many succeeding generations of a family have not only suffered from *gout* but have indulged in the unsatisfactory habits which tend to produce it, the children are born with a predisposition to the disease, and are then said to have the *gouty diathesis* or tendency. Not only does the predisposition extend from father to son, but this disease exhibits a peculiar form of inheritance called atavism (from *atavus*, a grandfather), in which the tendency skips a generation and shows itself again in the succeeding one. The stronger the inherited tendency, the earlier in life is the first attack of gout likely to occur, and the more difficult is it to ward off the attack, but in most cases it is possible to overcome the predisposition by strict adherence to abstemious habits.

Cancer is another affection of the same class. It sometimes runs in families, and there are those who hold that the tendency to it is transmitted from parent to child. This predisposition, if it exist at all, does not mean that the disease is transmitted at birth, and that the children who are born of parents suffering from cancer must necessarily also fall victims to the complaint. At most, the inheritance is simply that of weakness of resisting power on the part of the tissues of the body to the attack of cancer. What the actual cause is at present remains a mystery. It may be a microbe or a diseased development of the living cells of the body.

but whatever it is, something will be required to start it into activity. This something may be a state of general ill-health, or it may be of a local character, and so may determine the site of the cancer. It is certain that many injuries (such for instance as a blow on the breast) and many forms of long continued irritation (such as is produced by smoking a clay pipe, or by a jagged tooth, or by eczema of the nipple) have been followed by the formation of a cancer in the affected part.

The effects of inheritance have, however, been much exaggerated, for statistics show that it is quite the minority of those who suffer from cancer whose parents have been similarly affected. Indirect or distant inheritance may be disregarded, for in it there may be no relation of cause and effect.

Consumption was always looked upon as strongly hereditary, and many a person has been made miserable by the idea that, being a member of a consumptive family, he is sure sooner or later, in spite of everything he may do, to become affected with and die of the complaint. Consumption of the lungs certainly runs in families. But since it has been proved by Dr. Koch that consumption or tubercular disease, wherever it may appear, whether in the lungs or elsewhere, is undoubtedly caused by the tubercle bacillus, it follows that the malady cannot be directly inherited. That which is inherited in this affection is only the predisposition, which consists in a general delicacy of constitution that renders the individual more liable to fall a victim to the attack of the microbe. Added to this is the greater liability of the children of consumptive parents to be infected with the bacillus in their homes. But if such children are brought up in healthy surroundings, with proper precautions against infection, there is every reason to expect that they will remain free from the disease.

Another interesting point in heredity is the inheritance, in certain families, of *nervous diseases*. It is known that children born of mentally affected parents are prone to many nervous diseases, which may vary in different members of the same family. For instance, one may be born an idiot, another may become insane, another may be epileptic, whilst others may suffer from hysteria, or from various other conditions which show a weak and ill-balanced nervous system. A similar inheritance is sometimes the result of habitual alcoholic excess, especially if both parents have been addicted to the habit. Dipsomania itself also shows a strong tendency to be hereditary, and must be looked upon, under such circumstances, as one of the many manifestations of hereditary unsoundness of mind. All hereditary tendencies are more strongly marked when the parents are closely related by blood or have similar family peculiarities or constitutional tendencies. It is a matter of common knowledge that the children of cousins are often mentally affected or are the subjects of nervous affections.

Certain malformations also are inherited, such as an extra finger, or toe, or cleft palate, or hare-lip, and this is hardly to be wondered at when we remember that a "child bears its parents' likeness"—that he may have his father's nose, or his mother's eyes, that he may inherit his father's manner, his character, and even his voice. It has been calculated by Galton, a well-known writer on this subject, that the offspring inherits a fourth part from each parent—who therefore share equally the responsibilities of parentage—and a sixteenth part from each grandparent.

There can be no doubt, as we have already suggested, that certain conditions have a tendency to develop an hereditary taint. A life spent under unsatisfactory conditions, by which the frame generally and the nervous system in particular are debilitated and exhausted, prepares the way for the development of any hereditary but latent predisposition that exists. Trouble and worry, overwork and the struggle for wealth, continuous anxiety from poverty, unhealthy surroundings and dissipation are all powerful causes which act in this way.

Sex.

We must look also for some definite influence from sex as a predisposition to disease. There are, of course, the special complaints, which affect the male and the female, but apart from these there is no doubt that women are more often than men troubled by nervous conditions, such as hysteria and neuralgia. Anæmia, ulcer of the stomach, and persistent constipation are female complaints. On the other hand, men more frequently suffer from epilepsy, gout, and acute lung affection. The difference between the sexes in education, habits, customs, and occupations will to a great extent explain the liability of men and of women to different complaints. Girls, during their time of development and growth, spend much of their time in sedentary occupations, while boys, at that period of their lives, indulge in games and active exercise, and later on women stay at home and look after their houses and families, while men go out to earn their livelihood. Women are therefore more liable to the nervous complaints caused by worry and anxiety, such as hysteria and its allied conditions, and the various affections connected with maternity, whilst men suffer more commonly from the diseased conditions produced by injury, and the acute diseases caused by exposure and mental and physical strain. The various dietetic affections brought about by excess in eating and drinking, such as gout, alcoholism, and delirium tremens, are more commonly met with in the male sex than in the female. Although women are more frequently ailing than men, their complaints are not so serious or so liable to prove fatal. They interfere with their comfort and general usefulness, but the ultimate results are not so grave.

Cancer, however, is more common in women than in men, chiefly because of its liability to affect the reproductive organs and the breast. If these organs are omitted from our consideration, the disease would probably be found to fall with equal frequency on the two sexes.

Age.

The next predisposing cause of disease which we will consider is that of age. Many affections are peculiar to certain ages, and show a strong disposition to attack people at different periods of life, whilst others are common to all ages. Pneumonia, for instance, may attack a baby in its cradle or a centenarian with one foot in the grave. But there are other maladies to which we are more susceptible at one age than at another. In childhood rapid growth is taking place, and there is need for a liberal supply of nourishment, and the digestive organs, being thus kept hard at work, are very sensitive to any condition that acts injuriously on the body. The digestive organs of children are therefore those most commonly affected, as the result of bad, unsuitable, or deficient food, and diarrhœa from catarrh of the bowels is a particularly common complaint. Again, the nervous system of children is very sensitive, and is upset by much slighter irritations than would affect an adult. The presence of worms, some indigestible food, or the cutting of a tooth is often enough to throw a child into convulsions. The onset of a fever acts in a similar way, while in an adult it simply causes a shivering fit. A child is frightened and develops St. Vitus's dance, or shows a tendency to stutter. This sensitive condition of the nervous system of children shows itself constantly.

Children also have very little power of resistance, and are powerfully affected by exposure to cold; they have frequent attacks of catarrh from this cause, catarrh of the nose, of the bronchial tubes, and particularly of the bowels. Diseases of glands are chiefly met with in childhood; rickets, a disease of the bones, is hardly ever seen except at this period of life, and such maladies as scarlet fever, measles, and chicken pox, with whooping cough, must be all looked upon as children's complaints. Of course the latter diseases may attack persons of any age, but older persons are less liable to them than children, because of the immunity that one or more previous attacks confer. Adults generally are disposed to develop gout, diseases of the kidneys and liver, diabetes, and consumption. During adult life the hereditary tendency may still show itself, but much less strongly than in childhood, an exception, however, being the development of cancer, which is decidedly more common after forty than before.

In old age the body has begun to fail, and its various structures suffer from degeneration, and the blood vessels become inelastic and weakened, so that they are liable to give way upon slight strain, and hæmorrhage into various organs may occur, producing paralysis and apoplexy when the vessels of the brain are affected. Aneurysm (that is, dilatation of an artery), gangrene, and softening of the brain are other senile diseases. Man becomes a child again, he loses his power of resistance to external conditions, cold affects him as it affects a child, his heart is weakened and his circulation is poor, his lungs fail, and breathing becomes difficult. His lowered vitality renders him liable to many low inflammatory conditions of the lungs, bronchial tubes and organs generally.

From these considerations it is evident that we must consider that age is a definite predisposing cause of disease.

Temperament.

The influence of temperament upon disease used to be considered of great importance, and early writers on medicine paid much attention to the subject, and considered that every individual possessed a distinctive temperament which influenced him throughout his existence, in his actions, mental powers and disposition, and in his liability to various diseases. The varieties they recognised were so many and the distinctions so subtle that for practical purposes they were useless. There were the sanguine, melancholic, phlegmatic, choleric and nervous temperaments, as well as the jovial, saturnine and mercurial. The different varieties merged so gradually into one another that it was almost impossible to decide to which of them any given individual belonged. We have now ceased to attach any precise meaning to these terms in medicine, although we still sometimes use them in ordinary conversation. For instance, we should speak of a Frenchman as being of the nervous temperament, of a Dutchman as being of the phlegmatic temperament, of a painter or a musician as being of the artistic temperament.

Climate.

The subject of climate is as important in connection with the cause of disease as with its cure, for particular diseases flourish in particular climates, and disappear as the result of change. Certain organs, also, are liable to become affected according to the climate in which one has to live. It is not at all uncommon for those who have become accustomed to a certain climate to suffer in health when they are obliged to make a change. Probably the climate of London will be found to suit as many persons as that of any place, but we constantly meet with cases of illness in those who have lived for years in the country and are obliged to reside in London.

For the first twelve months or so they feel languid and out of health, and in the case of young women they may develop anæmia and its attendant troublesome symptoms, but after a certain time they get acclimatised, and become as strong and healthy as they used to be in the country.

The chief varieties of climate are the warm, temperate, and cold climates. In the *warm climates*, especially as they approach the tropical, the inhabitants are indolent and apathetic, the duties of the skin and liver are carried on with difficulty, the digestive functions are sluggish, and the nervous system is subjected to many exhausting influences. As a result diseases of the skin, liver, digestive organs and nervous system are very common in the tropics. We have already dealt with many tropical and subtropical complaints which are directly or indirectly due to climatic influences, the most important being malaria, plague, yellow fever, cholera, dysentery, and many affections of the liver. Most of these affections—especially the fevers—are hardly met with in temperate climates, for it is found that any temperature under 60° F. destroys their cause.

The diseases of *temperate climates*, especially climates that are variable, affect chiefly the lungs and kidneys, and are due to exposure to damp and cold. Catarrhal affections, bronchitis, pneumonia and rheumatism are all common.

Probably no climate is more healthy than a temperate one, for in it variations are slight, the winter not being very cold, nor the summer very warm.

Cold climates are healthy for those who can bear them. Those who are brought up in them become vigorous, and their muscular system is well developed; their digestion works well, and their nervous system is not over-sensitive; they suffer from few diseases due to climate, and often live to a good old age, owing, no doubt, to the hardening process through which they must have passed in childhood, and to the active life that the cold obliges them to live.

An *insular climate* has some very good points, for it is more equable than continental climates, the temperature of the sea varying less than that of the land, so that it is warmer in winter and colder in summer. Further, it is moister, and the clouds which are formed by the moisture shelter it from the sun's rays in summer, and prevent loss of heat by radiation in winter. Much as we grumble at the climate of the British Isles, it is really very equable, and the variations of temperature, although frequent, are not nearly so extreme as in many countries which we envy. But in spite of this there is no doubt that the frequent variations of climate in our "right little, tight little island" are fruitful causes of catarrh and of rheumatic affections, and explain in some degree the great prevalence of consumption, which is common in all temperate and moist climates, but is almost unknown in hot and dry countries, the explanation probably being that frequent attacks of catarrh weaken the lungs and form a fertile soil for the tubercle bacillus.

Soils.

Soils, too, have to be taken into account in connection with disease. Sand, gravel and chalk soils are pervious to water, rain quickly percolates away, and the locality, as a result, is dry and comparatively free from fogs. As a consequence, consumption, catarrh and rheumatism are less common in the districts where a porous soil prevails than in those where the soil is clayey; and it has been proved that a thorough system of drainage, which quickly carries off the surface water, is soon followed by an improvement in the health of the population. So actively injurious are damp cold soils, that some diseases occur in very circumscribed districts, such as particular valleys, in which the soil is damp and the amount of sunshine is limited. A disease called *cretinism*, a form of imbecility, occurs with great frequency in some of the Swiss valleys, where these unhealthy conditions exist, while higher up the mountains, or in the open plains, it is very rare. Another disease called *goitre*, which is an affection of the thyroid gland in the neck, very similar to cretinism, attacks the inhabitants of the same districts, though it is not absolutely peculiar to such districts, but when those affected remove to a different locality the disease often disappears, or at any rate improves. This disease is also common in certain parts of Derbyshire, and has hence received the name of *Derbyshire neck*.

Malaria also is a disease which is only found in marshy districts, with much rank vegetation, and disappears rapidly when good drainage is introduced, because the mosquitoes which carry the infection do not love a dry region. *Stone* in the bladder and kidney is a complaint which occurs with special frequency in limited areas in Scotland, Norfolk, and elsewhere, and probably owes its origin to the impregnation of the drinking water with large quantities of certain injurious salts.

Town and Country.

The conditions of life in towns are obviously more exhausting than those in the country. The wear and tear, the noise and struggle, gradually tell on the health, and mortality in towns is always greater in proportion to the population than in country districts. In towns the drainage is better, and the water supply purer, but in country districts the people breathe fresher air, live healthier lives, and get pure milk, and are perhaps subjected to fewer temptations from drink and dissipation.

Occupation.

The subject of occupation follows naturally after these considerations, for it almost divides the people into town and country folk. Probably of all occupations that of an agricultural labourer is the healthiest, and as a class these workers live longest. But very near them in the mortality tables come clergymen, barristers, farmers, gamekeepers, and grocers, all of whom are long lived. The occupations of schoolmasters, solicitors, and domestic servants are all fairly healthy. Doctors and drapers occupy a medium position, whilst at the bottom of the list—that is, those who are engaged in the most dangerous pursuits—are brewers, draymen, potmen, and publicans. Sedentary occupations predispose to disease, and especially to such affections as dyspepsia, nervous irritability, and gout. Miners breathe an air laden with carbon, knife grinders inhale fine particles of metal, and all those whose occupations produce much dust draw into their lungs numberless solid particles with the air they breathe, and as a consequence they are very liable to chest affections. Workers with poisonous substances, such as arsenic, lead, and acids, suffer from the absorption of the poison, which is introduced into their bodies through the lungs or the digestive organs.

In the hat making, bleaching and fur dyeing trades the operatives suffer from the irritating fumes to which they are exposed. House painters, plumbers, white-lead makers, japanners, glaziers and compositors are frequent sufferers from the lead they use in their work. Those who make arsenic, emerald green, or artificial flowers, or who are engaged in bird-stuffing, often exhibit the symptoms of arsenical poisoning. Barometer making, bronzing, skin and fur dressing are dangerous occupations, because of the absorption of mercury, and vulcanising indiarubber is unhealthy because of the use of bisulphide of carbon. Match making used to be one of the dangerous trades, from the disease of the jaw bones called "phossy jaw," produced by the entrance into the system of phosphorus through diseased teeth and in other ways, but this risk has almost been removed by the use of a special preparation, namely, the red phosphorus. Wool sorters and those who handle raw hides run the danger of contracting anthrax, or wool sorter's disease, which is produced by a microbe and transmitted by the wool and hides of diseased animals. Those who nurse and attend the sick are liable to infection, and many risks are run by the ambulance men who remove infectious cases, typhus cases being especially dangerous. Poisons of various diseases are liable to attack doctors in their work, and particularly if they are exposed to the risk when worn out by bodily or mental exertion, or by protracted fasting. All occupations which produce exhaustion, especially if combined with overwork, insufficient food or mental depression, predispose to disease. This is seen in its most marked form in armies in the field, especially when the men are anxious or are depressed by defeat.

Exposure to sudden changes of temperature, from one extreme to another, renders the occupations of bakers and stokers hazardous, and exposure to all weathers adds danger to the callings of cabmen, costermongers, street singers, and many others, making them liable to bronchitis and chest affections. There is much danger also in indulgence in violent exercise on the part of those who have to live sedentary lives. A young clerk, for instance, who spends his fortnight's holiday in hard mountain climbing, or a soldier who spends months in barracks and a few weeks in excessive exertion during manœuvres, necessarily incurs great risk. Lastly, writers, telegraphists and others, by the constant repetition of one movement may contract "craft palsies," of which writer's cramp is the best-known example.

Previous disease.

Previous attacks of disease have a distinct influence on the future history of an individual, and they may have two completely opposite effects: they may either protect from, or predispose to, a second attack. A person who has once suffered from one of the infectious diseases, scarlet fever, measles, small-pox, or whooping-cough, has a perfectly reasonable expectation of never suffering from it again; he is protected from future attacks, or enjoys immunity, as it is called. On the other hand an attack of pneumonia is very likely to be followed by another; one fit of gout is almost certain to be followed by others; an epileptic fit is probably a precursor of many; an attack of tonsillitis, or of acute rheumatism, has a great tendency to recurrence.

Again, an attack of rheumatism is likely to be followed by heart trouble, or at a later date by St. Vitus's dance; whooping-cough is believed to predispose to measles, and vice versa; an attack of gout leaves a predisposition to many other conditions of a gouty nature, such as lumbago, sciatica, and neuralgia.

Hygienic defects.

Any departure from the laws of health will soon receive its just reward in the shape of disease. Among the causes of disease which come under this head are want of personal cleanliness, unsuitable or insufficient clothing, abuse of food or drink, bad ventilation, defective drainage, contaminated water, and overcrowding. These and kindred topics will be dealt with in the Health section of the present work.

We have thus considered the most important predisposing causes of disease, and we can now understand that predisposition may be the result of inheritance, or it may be acquired by various accidental conditions, or by the neglect of the laws of health. Predisposition also may be so strong as to become an actual exciting cause of disease; indeed in many cases it is difficult to distinguish between predisposing and exciting causes.

EXCITING CAUSES

By the expression "exciting cause" we mean the actual conditions by which the disease is produced· and a very similar sense must be attached to the terms "proximate" and "determining cause."

Germs.

As medical knowledge increases, the definite cause of diseases becomes more fully known and understood, and one of the greatest advances made is the discovery that many affections are caused by *microscopic organisms.* The germ theory of disease, of which we have had something to say in the Introduction, is of quite recent date, and its real beginning was the discovery by Pasteur that fermentation was always caused by the presence of organisms. This was about the year 1836. The improvement of the microscope, the increase in the power of lenses, the more skilful manipulation acquired by experience, and the use of staining re-agents, rapidly strengthened belief in the germ theory. Septicæmia or blood-poisoning, and anthrax or splenic fever, were proved to be germ-produced diseases. In 1882 the tubercle bacillus was proved to cause consumption and other forms of tuberculosis, and the germ of cholera was found in 1883. Since that time the list of germ-produced diseases has increased enormously. Leprosy, relapsing fever, malaria, diphtheria, dysentery, typhoid fever, yellow fever, syphilis, acute pneumonia, and erysipelas are all known or believed to be caused by their own special germ, and rheumatic fever, whooping-cough, measles, scarlet fever, typhus, small-pox, hydrophobia, and lock-jaw will probably be added to the list. But before we can decide with certainty that a disease is germ-produced, it is necessary to discover the germ in the body of the affected person, grow it outside the body free from admixture with other germs, and produce the disease in a healthy body by injecting the cultivated germs.

Parasites.

There are certain vegetable and animal *parasites* which live upon or in our bodies, and produce special diseases. Many skin diseases are originated in this way; ringworm and similar complaints are due to the growth of minute vegetables or fungi, whilst the itch is caused by an animal parasite. The parasites which inhabit the bowel in human beings are the various forms of intestinal worms, thread, round and tape worms. Some parasites, both animal and vegetable, find their way into the various organs of the body and into the muscles and produce disease.

Cold.

We have dealt already with climate as a predisposing cause of disease, and we have now to treat of cold as one of the most fruitful exciting causes of disease in all temperate climates, and especially so in the proverbially changeable climate of this country, where it probably produces more illness than any other single influence. It acts injuriously on the body by depressing vital activity and checking the processes of nutrition in the parts subjected to its influence. When the body is exposed to cold the blood-vessels of the skin are contracted and the blood is driven from the surface to internal organs, where it is liable to set up congestion and inflammation. Cold may affect all the structures and organs of the body, but those most likely to be attacked by disease as a consequence of exposure to it are those that are weakened by some special predisposition. For instance, catarrh, gout, bronchitis, asthma, or rheumatism may follow, or the lungs, kidneys, or bowels be involved, according to the individual proclivity and weakness, the part least capable of resisting disease being the most likely to fall under the malign influence.

Cold acts much more powerfully when the air is damp than when it is dry, because dampness makes the air a better conductor of heat, and allows the heat of the body to be more rapidly dissipated. This explains why the extreme cold in the Arctic regions and in some parts of Canada can be better borne than the much less severe cold of the damp English winter. Cold also has greater effect when the air is in motion, for a breeze abstracts heat more rapidly than still air, and this is probably the explanation of the injurious effect of sitting in a draught.

The importance of cold as a cause of disease is shown by the rapid rise of the death-rate during the winter months, and by the great increase of illness that occurs immediately cold and damp weather sets in.

Cold is particularly injurious to the young and the aged, for they have much less power of resistance and reaction than persons of middle age. For a similar reason the feeble, ill-nourished and broken in health are seriously affected by exposure, and even the healthy run greater risk if at the time of exposure they are hungry, fatigued, worn out with worry, anxiety, or fear, or mentally depressed in any way. Although there is said to be a special Providence guarding a drunkard from accident, yet it does not apply to danger from cold, for this agent acts with particular virulence upon those who are under the effects of alcohol, and many deaths result from exposure after a debauch.

Cold may act prejudicially locally by injuring the actual spot exposed to its influence, or it may act indirectly through the nervous system. Among local affections due to cold we may name facial palsy from inflammation of the nerves of the face, frostbite and chilblains, while of indirect affections we have already mentioned many. The effects of long exposure to extreme degrees of cold are not often seen in this country. At first there is a sense of coldness and chilliness, a whiteness of the skin, with a peculiar condition called popularly " goose flesh." Then shivering sets in with tingling sensations, followed by numbness, and a feeling of weakness and inability to make any effort. This is succeeded by an overpowering propensity to sleep, which if once succumbed to ends in death, for the heart's action grows quicker and weaker, and finally ceases.

But in the cases with which we most commonly meet it is moderate degrees of cold that cause disease, the exposure of the body to a draught of cold air, or the results of cold and damp, as in getting the clothes soaked or the feet wet. It is still unknown why exposure to these agents produces inflammation. We consider that the first effect is a lowering of the vital activity, and of resistance of the affected part, but why this so often ends in inflammation is not very clear. Some believe that it is due to the existence of germs which are ever present and attack with success the weakened structures ; others believe that it is the effect of the cold acting directly on the part, and indirectly through the nervous system.

Heat.

Extremes meet, and heat as well as cold may be a cause of disease. In tropical climates it is productive of many complaints which are seldom met with in our country. Heatstroke or sunstroke is the condition produced by long exposure to great heat, and is the cause of many deaths in India and elsewhere. The local effects of heat in causing disease need not now detain us.

Poisons.

Poisons may be either animal, vegetable, or mineral. They may cause local disease by their irritating or corrosive action, or they may enter the system and produce symptoms which in many cases have a strong likeness to certain well-known general diseases. Of the *irritant* poisons a few of the most important are arsenic, antimony, and phosphorus, and the effects of these when taken in any quantity are very serious and severe, the two former producing symptoms very similar to those of cholera, and the latter symptoms much allied to a severe disease of the liver called acute yellow atrophy. Of *corrosive* poisons there are many which occasionally find entrance to the body accidentally or suicidally ; of the acids, carbolic, oxalic and sulphuric are most common ; of alkalies, caustic potash and soda. They cause great destruction of the parts with which they come in contact, and often prove fatal from shock before there has been time for their remoter effects on the body to show themselves. Mercury is another powerful poison, and some of its preparations act as corrosives, especially the perchloride or corrosive sublimate, which is much used in surgery as an antiseptic lotion. Mercury also, if taken as a medicine for too long a time, or in excessive doses, produces general symptoms. It is not used by medical men at the present time so freely as it used to be in the past, and the condition of poisoning called " salivation " is therefore not so often met with. Strychnia, another drug used in medicine, when taken in poisonous doses produces violent convulsions and death. Lead poisoning is not uncommon ; it is introduced into the body by the drinking-water, which dissolves it from leaden pipes, or it is derived from paint and other substances used in trade. The symptoms, which are most often met with in painters, include acute pain in the stomach, or lead colic, severe constipation, and a peculiar paralytic condition called " wrist drop."

Disease is produced by another class of poisonous substances introduced into the body by the bites or stings of animals, such as hydrophobia and snake poisons. Poisons introduced in food and drink, such as ptomaines, alcohol, etc., are described in the chapter on disorders caused by food and drink (Chap. XXXIV). An interesting subject in this connection is the production of disease by poisons engendered in our own bodies, which, under certain conditions, cause serious trouble. For instance, when the circulation and the respiration are imperfect the carbonic acid which is formed by the ordinary wear and tear of life may accumulate and cause dangerous symptoms from its poisonous effects. In jaundice also the retention of bile in the blood has a very deleterious action on the body. In certain diseases of the kidneys the action of these organs is arrested; the waste material called urea accumulates and causes a disease known as uræmia, which is accompanied with convulsions, and often ends fatally. Chronic constipation also, by an inefficient discharge of waste products from the bowels, is followed by many serious troubles from reabsorption of poisons into the system.

Morphia.

Lastly we come to certain injurious habits by which poisonous substances are voluntarily introduced into the body. We refer to alcohol, ether, morphia, opium, and similar substances. Morphia, or opium, may at first be given to a patient for pain or sleeplessness, and perhaps may have to be continued for a long time, and finally, when the need for it has disappeared, the patient may have developed such a craving for it that it causes him real suffering to go without it. This habit is most often met with in the cultured and refined classes, and in people with a high degree of intellectual power. It is far more common than most people imagine, and is decidedly on the increase, many high naval and military officers, artists, members of the medical and legal professions, who hold important positions, being known to be users of opium. The introduction of the morphia syringe seems to have assisted the spread of the habit, as it renders the administration of the drug a matter of great simplicity.

For some months after the habit has been acquired no particular harm results, and no definite symptoms show themselves to attract the observation of others, but after a time the nervous system and the general nutrition of the body begin to suffer, a peculiar pallor appears, and the victim feels intense languor and debility in the morning. The digestion also fails, there are dryness of mouth, loss of appetite, and constipated bowels. The morning is always the worst time for these persons; in the evening they are both mentally and physically at their best, and being so are sure to attempt any important duty or complicated work at the time when other people are going to bed. Nocturnal appetite goes with nocturnal activity, and a sufferer from this condition always wants to have food left in his bedroom at night. He also develops a great liking for sweets and confectionery—a trait which distinguishes the morphia victim from the alcoholic. He generally becomes an inveterate cigarette smoker, has a characteristic fondness for scent, becomes dirty in his habits, having the greatest repugnance to washing himself, grows thoughtless and forgetful, tells lies unblushingly and unnecessarily, sleeps badly, is irritable and restless, and after a time may suffer from hallucinations.

The habit may be continued for years, the amount of morphia taken varying much in quantity, sometimes less, at others more, but the general tendency is a downward one, and sooner or later serious symptoms set in, the ultimate result being prostration, emaciation and death, the bad effects of morphia depending more upon the length of time that it has been indulged in than upon the amount taken.

As we have suggested, the habit is contracted most insidiously. The poet Coleridge, who for years was an absolute slave to it, first took the drug for the relief of pain caused by rheumatism and neuralgia, and his friend De Quincey, the author of "Confessions of an Opium Eater," also first used it for a similar purpose. The latter consumed enormous quantities of the drug, and towards the last took as much as 9 ounces of laudanum a day, which is equal to 333 grains of solid opium; and even larger quantities have been taken by others. When we remember that from ½ to 1 grain is enough to put most people into a sound sleep, we can realise what a remarkable power of endurance the body obtains as the result of habit. Opium may be eaten, as in the case of De Quincey, or it may be smoked in a pipe, which is the plan generally adopted in China. In moderation, the habit does no great harm; indeed in some cases it seems to promote both bodily and mental activity, just as the Styrian peasants obtain increased power of endurance from doses of arsenic sufficient to prove fatal, were it not that they have become inured to the drug. But the habit is so insidious, and, once formed, is so hard to overcome, that we cannot too strongly advise all our readers to give it a wide berth.

The treatment of the morphia habit can be carried out by either of two methods, the gradual or the sudden. In the former the dose is gradually reduced, little by little, until the body has become accustomed to do without the drug, and at last the dose becomes so small that no suffering is experienced at its being discontinued. Whilst reducing the morphia it is well to give with it gradually increasing doses of atropine, the discontinuance of which will give no trouble. In the sudden method, the patient is isolated and put entirely under the constant care of nurses, never being left alone for a moment, nor is any article by which suicide can be committed left within his reach. No morphia is permitted unless anything like dangerous collapse should occur, when a small dose may be absolutely necessary. The strength must be maintained by careful feeding, fluid food alone being given for the first few days, and solid food only as the patient improves. Sleeplessness is relieved by warm baths and an occasional dose of ½ drachm of bromide of sodium at bedtime; headache by cold; irritability of the stomach and diarrhœa by carbonate of bismuth; exhaustion by small quantities of stimulants, and constipation by suitable aperients. After three or four weeks' complete abstinence from the drug, a change of air and scene is advisable, and upon no excuse whatever should morphia or opium in any form be again permitted.

Chloral is another drug which develops a habit, and the chloral

Chloral.

habit is as dangerous as that of morphia. The drug is used medicinally to produce sleep, and does so without bad after-effects, but unfortunately it can be easily obtained, and is sometimes used by persons on their own initiative, and without medical advice. Because it causes no immediate disagreeable effects they imagine it is harmless, but they are grievously mistaken, for a habit is soon acquired, the craving is overpowering, and the dose has gradually to be increased. This is exceedingly dangerous, for an overdose causes rapid death, and even small doses taken for a long time have a most injurious effect on the nervous system, and many other organs of the body. An overdose produces unconsciousness and death ; a small dose, frequently taken, weakens the mental powers, and finally causes imbecility ; skin eruptions form, the eyes grow watery and red, the digestion suffers, and great difficulty of breathing sets in. The only efficacious treatment is absolutely to discontinue the use of the drug.

Indian Hemp.

Indian hemp is more commonly indulged in by the inhabitants of Eastern lands, although it is used by us as a medicine. It forms the haschisch of the Arabians, and the gunjah of the Hindoo. It produces delicious dreams in which its votaries imagine themselves rich beyond the dreams of avarice, and surrounded by all the delights of paradise. From the name haschisch is derived the term " assassins," for the chief of the Society of Assassins admitted new members when they were under the influence of this drug, and it is while under its baleful spell that natives often run amok, as it is termed, killing everyone they meet.

Tobacco.

Tobacco may be used for smoking, or chewing, or in the form of snuff, and if carried to excess may have very injurious effects. Tobacco is the dried leaf of the plant *Nicotiana tabacum*, and contains a drug called nicotine, which is so powerful that a drop or two will cause almost instant unconsciousness, and death in five minutes, and death has occurred by the accidental drinking of an infusion of tobacco for coffee, or by swallowing a quid of tobacco whilst chewing it. Fortunately for those who indulge in tobacco smoking, very little of this active principle enters the system, but if smoking is carried to excess serious consequences may ensue. Many instances have been met with of sudden attacks of unconsciousness and faintness from heavy smoking, and still more of what is called the " tobacco heart" or " smoker's heart." In this condition the action of the heart becomes very irregular and palpitating, and nothing cures the symptom but entire abstinence from the indulgence. Even very moderate smoking is quite sufficient to keep up the trouble. Smoking also causes a very irritable condition of the throat, which becomes dry and sensitive, a most troublesome cough is set up with constant "hawking" and spitting; apparently this trouble is more often the result of cigarette smoking. In other cases a persistent form of indigestion is produced, the tongue gets furred, the appetite fails, and there is constant gastric discomfort. Lastly, there is a serious affection of sight which is produced by nicotine poisoning. The sight grows dim, a white haze surrounds objects, and finally blindness sets in which is peculiar in that it only affects the centre of the field of vision; the whole central part appears black, although objects can be seen towards the edges of the field. This condition is recovered from completely if tobacco is entirely tabooed. These troubles do not occur so frequently when tobacco is used as snuff or for chewing, as the tobacco for these purposes is so prepared that it contains much less nicotine, and is much milder, and also because very little of the poison is absorbed by the mucous membrane of the mouth and nose.

The drugs we have been considering are all sedatives, or narcotics as they are called, but there is another class, namely stimulants, which also produce drug habits, and very serious states of disease. The most important of these is alcohol, and poisoning by it in its many forms is only too common.

Ether.

Ether is another stimulant which is occasionally indulged in to excess. It is drunk in some manufacturing towns, and is said to be a common beverage in Ireland. When Father Mathew, "the Apostle of Temperance," put down indulgence in alcohol in that country by his crusade from 1838 to 1856, many of his converts are said to have taken to drinking ether in its place, and the habit has continued to the present day. Ether is far less agreeable in flavour than alcohol, but has very similar effects. It acts as a powerful stimulant to the digestive organs, and it disturbs the nervous system as alcohol does, but its effects both appear and disappear more rapidly.

We may briefly enumerate some of the many other substances which are occasionally productive of the drug habit. Now that medicines are made in tablet form, and are so easy to obtain, and so convenient to carry about, a good deal of amateur doctoring takes place, and much harm is often done by the use of strong drugs with quite unnecessary frequency. Drug habits may be induced by such medicines as antipyrin, phenacetin, cocaine, and many others. It is a curious but interesting fact that all the world over the inhabitants, black, white, or yellow, have some form of self-indulgence in the form of drugs. Tobacco, the use of which has spread over a large portion of the habitable globe, we have already mentioned ; the hop is also used over a very extended sphere ; opium is an indulgence of millions of Chinese, Indians and Asiatics generally ; Indian hemp is employed widely amongst Eastern nations ; the betel nut is chewed throughout a large part of the farther East by the Malay and Hindoo races ; the coca leaf, mixed with powdered lime, is chewed by the Peruvian natives and workmen, much as our own working man employs his pipe ; the thorn apple is indulged in also by the Peruvians, and in the Himalayas; in Siberia the native, hard-pressed to satisfy his craving for narcotic indulgence, has found it in a humble fungus, the Siberian or intoxicating toadstool. The craving for such indulgence and the habit of gratifying it are therefore little less universal than the desire for and consumption of the necessary articles of food.

Other Drugs.

Injuries and accidents are causes of disease, chiefly of a local character, though internal organs may be involved and inflammation be started in them. For instance, in fracture of the ribs, the lung or the pleura—the membrane which lines the lung—may be injured by the broken ends of the bones, and pneumonia or pleurisy may follow. Injury from over-exertion or strain may cause a rupture in various parts, or hæmorrhage from the lungs or tearing of the valves of the heart. Again, injuries may cause disease more remotely, as the results of inflammation, and the formation of contracting scars. In this way stricture of the gullet is developed after accidental swallowing of a corrosive fluid.

Injuries.

CHAPTER XXXVI

CLASSIFICATION OF DISEASES AND THE COURSE THEY RUN

Classification : General or Local—Organic or Functional—Acute, Sub-acute, Chronic—Pandemic, Endemic, Epidemic, Sporadic—Hereditary, Congenital, Acquired—Preventible Diseases—Specific Diseases—Contagion and Infection. Course of Diseases : Onset—Incubation Period—Invasion—Eruption—Decline, Crisis—Lysis—Convalescence—Complications—Sequelæ.

CLASSIFICATION

Although the classification of diseases does not aid us much in their recognition and treatment, yet many of the words employed are so often used in everyday conversation that it will be well to explain shortly the various methods and the meaning of the words.

General or Local.

To begin with, we may divide diseases into classes according to the parts affected, and we then speak of them as general on the one hand and local on the other, the first being those that affect the whole body, and the latter those that implicate some special part or organ. Among *general* diseases we must include all the specific or infectious fevers, and those affections which are due to some constitutional weakness or blood disease, such as gout, rheumatism, tuberculosis, cancer, and rickets, whilst among *local* diseases we place those that attack a particular organ, as the lungs or brain, or a particular tissue, as bone or skin. Examples of local diseases are pneumonia, apoplexy, periostitis (inflammation of the membrane that lines bone), and eczema. This arrangement is perhaps useful, but is likely to be misleading, and is certainly inaccurate in some instances. Pneumonia, for example, is an inflammation of the lungs, and in that sense a local disease ; but it is accompanied with many severe constitutional symptoms which affect the whole body, such as quick pulse, hot skin and flushed face, which, with raised temperature, are the symptoms of fever. In this sense, therefore, it is a constitutional disease, and we should be much in error if we attempted to treat the trouble of the lung and neglected the symptoms of fever. This is a mistake that even doctors sometimes make, especially those who lack experience. It is the mistake of treating the disease and forgetting the patient. Again, some local diseases are due to a general constitutional weakness. Some diseases of bone, for instance, are caused by the formation of tubercle in its substance, and if we were to treat the local manifestation of the tubercular constitution and forget the general weakness, our treatment would be a failure and our patient would suffer accordingly. Gout, again, might be looked upon as a local disease if we paid attention only to the condition of the toe joint, but no one would dream of treating only the local trouble; we must cure the constitutional tendency and look upon the inflamed toe as one of its manifestations. The classification of diseases therefore into general and local is not a satisfactory one.

Organic or Functional.

Another division, which applies chiefly to local complaints, is into organic or structural, on the one hand, and functional on the other hand. The former group consists of those complaints in which there is some definite change in the structure of the affected parts, which we can discover with the naked eye or with a microscope, whilst functional diseases are those in which the duties or functions of an organ or part are interfered with or deranged without any change in its structure that we can discover.

Although the fact of our being unable to discover a structural change may be in many cases due only to our limited powers of observation, yet this division is of value, for most functional troubles are less important and more capable of cure than organic diseases. Palpitation of the heart, for example, if due to indigestion or oversmoking, and therefore only functional, is far less serious than palpitation accompanying disease of the organ. Many nervous disorders are purely functional in origin, and the most careful search shows no definite change in any part of the nerve organs; but if these are inflamed or softened or are injured by hæmorrhage, then organic disease is said to be present. The most common organic changes are caused by inflammation, degeneration, or new growths. The knowledge that functional disorders are usually not of grave significance is fairly general, and many a time is the anxiety of both doctor and patient relieved by the discovery, after a careful examination, that organic disease is absent.

Diseases are sometimes classified according to their intensity and duration, when they are said to be acute, sub-acute, or chronic. A complaint that comes on suddenly, runs a rapid course, and is accompanied by severe symptoms, is called an acute disease. It may be dangerous as in pneumonia, or it may involve no risk to life as in eczema. On the other hand, if it is slow in its progress, of long duration, and unaccompanied with any violent or active symptoms, it is said to be chronic. A mistaken idea prevails that by chronic we mean unimportant or something that must be endured, and that nothing need be done for it in the way of treatment, but how far from the truth this is may be realised when we know that consumption often runs a chronic course, that cancer may be chronic in its progress, and that many a chronic disease may be gradually but surely progressing to a fatal termination.

Acute, Sub-acute, Chronic.

Any affection that takes an intermediate course between these two extremes is called sub-acute, and all three varieties may be met with in the same complaint, as in rheumatism, which may be acute, sub-acute, or chronic.

Still another classification is formed upon the mode of distribution of diseases in communities or districts. An illness which may occur universally in all countries and amongst all peoples is spoken of as pandemic, but if it is localised by certain special conditions which are peculiar to a limited district, it is called endemic.

Pandemic or Endemic.

Scarlet fever and influenza are pandemic complaints, and the best example of endemic diseases is goitre, which is met with in close, damp, sunless valleys, in many parts of the world, and is so evidently due to local conditions that it is possible to develop it by residence in a goitrous district, and to get rid of it by moving to more healthy surroundings. Enteric fever is also endemic in certain unhealthy and badly drained districts where a sprinkling of cases is always to be found, but occasionally, as the result of continued hot, dry weather or the contamination of the water or milk supply, an enormous increase may take place in the number of cases, and the disease spreads widely to other districts. In these circumstances the disease becomes epidemic. Influenza, cholera, plague, and many other complaints are met with as epidemics. There are strong reasons for thinking that all epidemic diseases are germ-produced, and are spread by any of those means that

Epidemic.

are capable of transmitting the germs, such as food and drink, special atmospheric conditions, and long-continued winds.

A complaint that occurs as it were accidentally, and in an isolated manner, is spoken of as sporadic.

Sporadic.

When considering the causes of disease we found that inheritance was at the root of a large number of complaints, and that distinct from these were many conditions present at birth, but not necessarily inherited, such as the deformities of club-foot and hare-lip. The former are called hereditary complaints and the latter congenital. If diseases develop in after life through negligence of the rules of health, bad habits or exposure, and quite apart from any hereditary taint, they are said to be acquired. Gout, for example, may be acquired by overeating and overdrinking, combined with sedentary habits; and consumption may be acquired by exposure, starvation and dissipation. If, therefore, we divide diseases according to their cause and their mode of origin, we have the three classes of congenital, hereditary, and acquired.

Hereditary, Congenital, Acquired.

Lastly we may consider that the acquired diseases may by care and avoidance of the known cause be altogether escaped; if so they may be classified as preventible. Diseases due either directly or indirectly to some neglect of the laws of nature, justice, or morality are preventible, and the greater our knowledge of these laws the larger will the list of such diseases become. The large class of infectious and contagious complaints must be included in this list. They are believed to be due to a *specific* poison—that is, a poison peculiar to each disease, and which will in no circumstances ever produce another disease. It is conceivable that the time may come when we shall be able to protect ourselves from such poisons.

Preventible Diseases.

Some distinction is drawn between contagious and infectious diseases. The former are transmitted by direct contact, or inoculation, such as enteric fever, in which the poison is introduced with drink or food, or hydrophobia, in which it is directly inoculated in a wound; infectious diseases on the other hand are transmitted by means of the atmosphere, without any direct contact or obvious application of the poison to the body, and enter the system generally by respiration. The most characteristic of the infectious diseases are scarlet fever and influenza.

Contagion and Infection.

COURSE OF DISEASES

The course that diseases run is as a rule very indefinite, and depends upon so many little-known conditions that it is impossible to tell with any certainty the course and termination of any particular attack of illness. Nothing occasions the doctor greater difficulty than to give definite answers to the many questions put to him by anxious friends and relatives as to the probable degree of severity of an illness, and the length of time it will run. He knows the ordinary course, period, and termination of the illness, but in giving his opinion he has to take into account the patient, his predisposition, constitution, and surroundings. Medicine is not an exact science, because it deals with health and disease, life and death — conditions which are too subtle to be measured with exactitude. Our knowledge of the results of disease, of the length of life and the probability of death, as applied to masses of people or to distinct classes of the community, is very exact and accurate, but when applied to any particular individual it is unfortunately quite the reverse. It is quite possible to state the probable course of an attack of enteric fever, and to give the average percentage of recoveries, but when we attempt to be prophetic in any special case, we are as likely as not to be wrong. However, in tracing the course of a disease from the first exposure to its exciting cause onward to its termination, there are certain distinct stages which can be recognised.

Onset.

The onset of disease may be sudden or gradual. An accident or a stroke of paralysis produces immediate results, but in the great majority of cases the onset is gradual, the symptoms appearing one after the other until the attack is fully developed.

Incubation Period.

Invasion.

Eruption.

The interval between the exposure to the cause and the first appearance of symptoms is called the latent or incubation period, and its length varies, of course, in different complaints. In diseases caused by exposure to cold it is indefinite, but in connection with the infectious fevers we can speak with much greater certainty. The next stage is known as invasion: the anxious latent period is over, and now definite symptoms show themselves, by which we are able to recognise the complaint. After a few days, in the case of the eruptive fevers a characteristic rash shows itself; this is termed the stage of eruption. The disease now takes its course, reaches its climax, and finally begins to pass off; the disappearance of symptoms being called the stage of defervescence or decline. This stage in some complaints is short and sudden, and the decline is then said to occur by *crisis*. This is a particularly common termination in cases of pneumonia, it occurs often in measles and in malaria, it is not uncommon in other affections, and is more likely to be seen in those attacks which begin suddenly with severe symptoms and rapid rise of temperature. At the time of crisis conditions are likely to be met with which are called *critical evacuations*: there may be a profuse warm perspiration, a copious flow of urine, or an attack of diarrhœa. A prolonged sound sleep from which the patient wakes refreshed, and with recovery plainly shown in his countenance, is a common critical phenomenon.

Decline by Crisis.

If the stage of decline is gradual, and spread over several days, it is said to take place by lysis, a word of Greek origin signifying a *loosing*. The symptoms grow less and less day by day, and the temperature falls slowly, being a little lower each day than at the same time the preceding day. This mode of termination is almost always seen in enteric (typhoid) fever, and in a great number of other complaints.

Lysis.

The stage of decline ends in the stage of convalescence, the signs of health showing themselves gradually until it is fully restored. But convalescence may be interrupted, or the disease may not take the even tenour of its way; some symptoms grow serious, or some unusual condition appears. These complications may disturb any complaint, however simple or severe it may be, and they are the cause of the doubtful and indefinite forecast that must in such cases be given. They are the result, only too often, of unsatisfactory treatment, of carelessness on the part of the nurse or ignorance on the part of the patient. How often has pneumonia complicated influenza through the patient wilfully going out contrary to advice, or kidney disease followed scarlet fever through chill from negligence or accident.

Convalescence.

Complications.

Sometimes convalescence is imperfect, some symptom or other remains, a troublesome cough follows an attack of bronchitis, and runs on into consumption, or valvular heart disease remains after acute rheumatism. Such untoward results of

Sequelæ.

illness are called sequelæ, and their possible occurrence is the chief anxiety in many an otherwise unimportant illness.

Fortunately most diseases tend to recovery, and if suitable care and appropriate treatment are employed, end favourably, without leaving any important result from their visitation; but if there is a weak point in the patient's constitution the disease may be more than he can cope with, and death may be the result. A fatal termination may be caused by general weakness, or it may be due to some sudden complication such as hæmorrhage or shock, or it may result from heart failure and fainting, or from failure of the respiratory organs, or from failure of the functions of the brain so that the patient sinks into a state of coma.

In the management of every illness it is well to know the probable course it will pursue, the accidents and complications that are likely to occur, and the possible sequelæ that may remain after it has subsided. Having thus armed ourselves with what knowledge we can acquire, we may proceed to carry out, with common sense and the best skill that we are capable of exercising, the treatment prescribed by the doctor, trusting that as the result of constant care and attention the case may be carried through to a satisfactory convalescence and a successful termination.

CHAPTER XXXVII

HOW TO DETECT DISEASE

Signs and Symptoms—Diagnosis—Premonitory Symptoms—Methods of Examination: Inspection; Palpation; Percussion; Auscultation—The Microscope and other Instruments used in Diagnosis—The Patient's Appearance—The Pulse—The Breathing—The Skin—The Temperature—The Tongue—The Eyes—Loss of Weight—X-rays—Prognosis.

It is of the utmost importance to know how to detect the presence of disease at as early a stage as possible, for the earlier it is recognised the more useful is any treatment which is employed, and by detecting the first signs of a departure from a healthy condition many serious and even life-endangering diseases may be prevented.

The various phenomena which show a departure from health are called the signs and symptoms of disease; these terms are often employed indiscriminately as having the same meaning, but it is possible to distinguish between them.

Signs and Symptoms.

Those evidences of illness which a patient experiences and which he would mention to a doctor to explain his complaint, all such conditions as are perceived by himself alone and cannot be definitely recognised by another, are the *symptoms* of his disease: for instance, the feeling of pain or nausea or faintness. These are called also subjective symptoms, in contradistinction to those conditions which can be recognised by another and are called objective symptoms or *signs*. Signs are, therefore, those evidences which may be recognised by the senses of another, assisted by any appliances which he may have at his disposal.

But before we can interpret the meaning of the many signs and symptoms we may come across, and recognise the presence of disease by reason of them, we must have some knowledge of what takes place in a healthy body. For example, many people would consider that there was something seriously wrong with their digestion if after drinking a glass of milk they were sick and brought up curds. The fact of being sick may be reasonably considered a sign of disease, but that of bringing up curds is certainly not so, because it is the normal condition of things for milk to curdle as soon as it is mixed with the acid gastric juice; indeed if the milk were to return after being in the stomach for some time uncurdled, it would be a sign of disease, showing a serious lack of healthy gastric juice.

Having, therefore, some knowledge of the various processes which occur in ordinary health (and this can be obtained by reading the sections on anatomy and physiology, already given), we are in a position to recognise the symptoms and signs of disease.

These by themselves are not diseases, although in some cases they are spoken of as such. Jaundice, for instance, which is due to bile circulating in the blood, is sometimes taken to be a disease, but is really only a symptom of some condition which prevents the proper passage of the bile into the bowel. Vomiting also might be looked upon as a separate complaint, but is only a symptom, and occurs in such diverse conditions as indigestion and tumour of the brain. In detecting disease, therefore, it is necessary to observe all the symptoms and signs which exist, and then decide what disease all of them put together represent.

Diagnosis.

The process of explaining the meaning of a group of symptoms and giving a name to the disease they signify is what doctors called forming a diagnosis, and the opinion thus formed goes by the same name. The formation of a correct diagnosis is of great importance, because until this is done no satisfactory treatment of the disease is possible: we are obliged either to act in the dark or to treat the different symptoms.

Premonitory Symptoms.

First we must briefly deal with the class of premonitory or warning symptoms. It is important to know something about these, for in many an illness treatment applied at once may save much trouble later. The most common premonitory symptoms are fever and shivering fits, or more correctly *rigors*. These rigors may be the result of chill simply, but they also occur at the beginning of many infectious fevers and severe inflammatory diseases, and are very common before inflammation of the lungs. The difference between a rigor and a simple shivering fit is that in the latter the temperature is not raised (may, indeed, be a little lowered), whilst during a rigor it is certainly raised, sometimes to a most alarming degree. The thermometer therefore is a means of distinguishing one from the other.

Another alarming premonitory symptom is *convulsions;* these are much more common in children than in adults, and often occur in children's complaints, as rigors do in those of adults. Their importance depends upon their cause, for they may be produced by slight irritation, as that of teething or of worms, or by severe illness, as the onset of an attack of scarlet fever.

Some interesting premonitory symptoms occur in connection with diseases of the nervous system. In epilepsy, for instance, there is often a curious phenomenon to which the name of "aura" has been given, which precedes and gives warning of the coming fit. It takes many different forms, occasionally being only a feeling of malaise or irritability of temper, at other times a strange taste or an ill smell, an extraordinary noise or a spectral illusion.

There are very characteristic premonitory symptoms also in attacks of megrim or sick headache, one of the most common being an affection of the sight, consisting in a "blind patch" which gradually grows larger up to the time the headache comes on.

We will now spend a few minutes in learning the various means that are at the disposal of the medical man in detecting disease, and perhaps the easiest and most instructive plan will be to visit a doctor and watch him whilst he sees his patients as they come in turn into his consulting room.

Patient and Doctor.

The first patient he happens to see to-day is a young girl of twenty-one, who comes with her elderly maid. She is very pretty, with a bright colour, fair hair and white skin; she is somewhat thin, and looks weary. The doctor asks her her name, age, and address, her family history, her habits of life, and what previous illnesses she has had. He thus discovers what predisposition she has to disease. She says she was fairly strong and quite healthy until six months ago, when she caught cold at a dance, and had inflammation of the lungs; since then she has never quite recovered her health, she has got thinner, sleeps badly, and perspires a good deal at night; the cough she had with the pneumonia has never quite left her, and latterly it has been worse, and two days ago was so bad that she brought up a little blood.

These are some of the symptoms of her illness.

The doctor notices whilst he is talking to her the flush on her cheeks, the brightness of her eyes, the pallor of her skin, the wasted frame, the troublesome cough, her breathlessness when talking; all of which are signs to excite alarm.

Inspection.

He proceeds in due course to examine her chest, he looks at it while she breathes, and sees that the right side at the upper part is flatter than the left side, and moves less when she takes a deep breath. By the sense of sight, or inspection, much can be discovered in this case, and in many others.

Palpation.

He then places his hand on her chest, and asks her to take a deep breath: he can now feel the deficiency of movement on the right side. He asks her to say ninety-nine, or one, two, three, and in this way feels how the vibrations of the voice are transmitted to his hand. This method of examination is called palpation, and brings into play the sense of touch. The vibrations caused by the voice are felt more on the diseased side than on the healthy when the lung is solid, as in pneumonia or consumption; less when there is fluid present, as in pleurisy. By palpation many other signs of disease can be discovered.

Percussion.

The next step the doctor takes is to place the fingers of his left hand flat on the chest, and give sharp taps on them with the fingers of the other hand. This is termed percussion. The sound produced by this means has a certain character called "resonance," which denotes the presence of healthy air-containing lung under the hand; or another character which is called "dulness," and which shows that the lung is solid and contains no air, or that the place of the lung is taken by fluid.

Auscultation.

Another method the doctor employs is to listen to the chest, and this examination by the sense of hearing is called auscultation. He either applies his ear directly to it, covered by a towel, or he uses an instrument called a stethoscope. This is sometimes a wooden instrument generally made with a central canal, and spread out at each end, flat at one extremity to apply to the ear, and trumpet shaped at the other to apply to the chest; but another form of stethoscope (Fig. 53) is now more commonly used consisting of metal and indiarubber tubes, which connect the trumpet shaped chest-piece with two ivory endpieces to fit into the ears. This instrument has become popular because it avoids the necessity for placing the head against the chest, and because it is possible to listen to all parts of the chest without obliging the patient to move much. It is especially useful for children.

By auscultation much can be learnt. First the natural healthy sounds produced by the air passing into the lungs can be recognised, and any alteration in them noted. If the air passes through air tubes with phlegm in them it will make a bubbling sound, which differs according to the thickness of the fluid; if the tubes are contracted and their lumen (the canal) diminished, there will be a whistling sound. If, again, the lung is solid as in inflammation, the sounds will be transmitted more loudly; if fluid has formed between the lung and the chest wall as in pleurisy, the sounds will hardly be heard at all, or heard as in the distance.

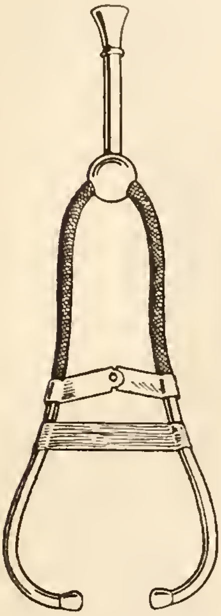


Fig. 53.—STETHOSCOPE.

These various examples are sufficient to show the value of auscultation.

By this means the doctor discovers that his patient has dulness, has increased voice sounds, and other signs of solid lung at the upper part of the right side. But the solid lung may be due to simple inflammation, or to the presence of tubercular disease (consumption). How is he to distinguish between the two?—a critical question, indeed, for all that he has to say as to her future prospects depends upon it. This further question can be determined by the microscope. A small portion of the expectoration is placed under the microscope, after being treated in a special way and stained with the proper colouring matter. If the doctor discovers the presence of small rod shaped bodies, the tubercle bacilli, he feels obliged to give a serious opinion, for consumption is the diagnosis; but if the germs are absent he feels much more happy and speaks much more cheerfully of the patient's future prospects.

From the microscope much can be learnt in our struggle with disease. Besides the tubercle bacilli already mentioned, blood, matter, and even small portions of the lung itself may be expectorated, and can be recognised under this instrument.

The microscopic examination of the blood also is of great importance in many cases. By it the number of both red and white cells in the blood can be counted. This is of value in anæmia and its allied affections, and in a condition called leucocythæmia, in which the white cells are enormously in excess of the normal proportion.

The Microscope in Diagnosis.

The blood cells can be found by the microscope in expectoration, vomit, urine, etc., even when present only in small numbers, and their discovery may be of great assistance in forming a definite opinion as to the nature of the case.

By the microscopic examination of the urine we can distinguish the various sorts of crystals which occur as deposits, and thus recognise certain unhealthy states of the system in which such deposits are produced.

We may also find little moulds, or casts as they are called, of the tubes of the kidneys, and as casts are never formed except when these organs are diseased, they enable us to locate the situation of the trouble.

Matter (or pus) in minute quantity can also be recognised under the microscope, and its presence may solve many a difficulty.

In cases of malaria, the little parasite which produces the disease is frequently seen in a microscopic examination of the blood.

Other Instruments Used in Diagnosis.

By an instrument called an ophthalmoscope (Fig. 54), a doctor can examine the inside of the eye. He can thus observe the translucency or opacity of the parts through which light has to pass, he can see the retina, observe the state of its circulation, and notice any disease or injury that may be present. He can also see the termination of the optic nerve, and from its condition learn much of the state of the circulation in the brain, and may discover symptoms of certain brain diseases. The larynx is examined by a very similar instrument called a laryngoscope (Vol. I., p. 253), by which light is reflected down the windpipe, and a picture of the parts seen in a mirror.

Patient's Appearance.

Although there are not many diseases that can be recognised by a single symptom, there are some that can be determined by general observation of the patient's appearance, position and manner. At one time much importance was attached to diagnosis from physiognomy, that is, recognising a complaint from the sufferer's general appearance, but as other methods of examination have become more accurate and exact, this has fallen greatly in importance. Much, however, may be learnt from a glance at the patient, and a rapid diagnosis may be made which would delight the heart of a quack and would impress his victim with his wonderful ability and insight.

But, quackery apart, let us suppose that another patient comes into the consulting room which we visited just now—a child with the irregular purposeless movements of St. Vitus's dance. Our doctor could diagnose the case at a glance, and without making any examination could safely say to the mother, "Your child is suffering from chorea; she has had rheumatism, and her heart is far from strong," because those conditions have a very close and common connection with one another.

Another patient enters, a young girl, as white as a ghost, and the doctor may say, "You are suffering from poorness of blood (anæmia). You are breathless when you go upstairs, you suffer from headaches and palpitation, and imagine your heart is diseased; you are low spirited and without energy, and are troubled with constipated bowels;" that is, he would give a list of the common symptoms of anæmia.

Fig. 54.—Ophthalmoscope.

The last patient who comes to consult the doctor is a middle-aged man of the working class, who walks into the room in a peculiar way, and cannot raise his hand to shake the doctor's. The latter asks to see his gums, and discovering the blue line of lead poisoning, says: "You use lead in your occupation; you suffer from violent attacks of stomachache, your bowels are obstinately constipated, and your wrist-drop and difficulty of walking are due to lead palsy."

These cases show how much can be learnt by the sense of sight. The face will tell much: pallor shows poorness or deficiency of blood; blueness, imperfect circulation; redness, congestion or plethora; yellowness, some affection of the liver. Many eruptions can be recognised at a glance: acne appears on the forehead, acne rosacea on the nose, barber's itch on the chin and cheeks, and many of the eruptions of the infectious fevers show themselves on the face. It is easy also to the practised eye to recognise the scars about the angles of the mouth in congenital syphilis, the ulcers of lupus, and the "pitting" left by small-pox.

Patient's Expression.

Who also could fail to recognise characteristic forms of expression? There is the dull, expressionless appearance of the deaf person, the vacant look and open mouth of the child with enlarged tonsils or nasal obstruction, the heavy fatuous expression of the idiot, the wild, vivacious expression of the maniac, the flushed face and bright eyes of fever, the hectic flush and wasted cheeks of the consumptive, the pallid and waxy skin of severe hæmorrhage. The expression also conveys information of past or present mental emotions. Pain stamps its mark on the face, and anxiety and worry draw their lines and furrows.

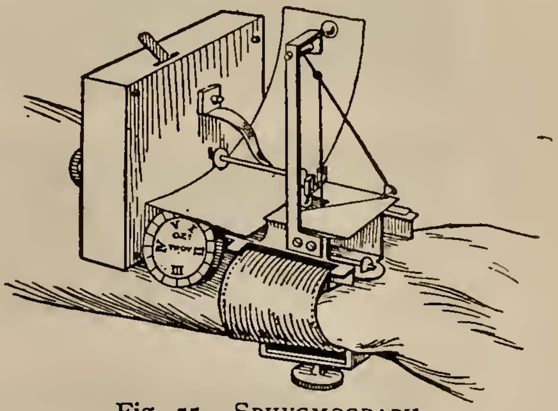


Fig. 55.—Sphygmograph.

This subject—the recognition of disease from the patient's appearance and expression—is of especial importance in the diseases of children, for the little sufferer may be too young or too shy to help us by explaining his feelings, and the observant mother or capable nurse, well accustomed to the child's natural appearance, may recognise many slight alterations which indicate the onset of disease.

The Pulse.

For the detection of disease we must also observe the condition of the circulation, and the most trustworthy indication of this is the pulse. Its ordinary rate is in adults from 70 to 80 a minute, and everyone can count the number of beats, although he may not be able to recognise slight changes in its strength and character. The rate is increased by fever, and many other diseased conditions, but it must not be forgotten how great an effect nervousness, excitement, and exertion may have in this direction. A doctor will always examine and count the pulse, and if for any reason he may think it necessary he can draw a diagram of its movements (Figs. 56 and 57) by using an ingenious little instrument called the sphygmograph (Fig. 55).

The movements of respiration teach us much in the recognition of disease, both by variations in their number and by the way in which they are performed. The normal number per minute in an adult is from

Breathing.

15 to 20, in a child about 25, and in an infant often as many as 40. If the respirations are appreciably increased or diminished in number there is some definite reason for it. Rapid breathing is unimportant if caused by excitement, nervousness or exertion, but, such causes being absent, it is a sign of disease. All feverish conditions, most diseases of the respiratory organs, and many affections of the heart cause increased frequency of breathing. In health the rapidity of the respiratory movements and the heart beats increase together—one of the former to four or five of the latter—but sometimes as the result of disease one increases in a much greater proportion than the other. If the heart beats increase out of proportion to respiration we fear affection of the heart; if the respirations increase to an exceptional extent we recognise the presence of disease of the lungs.

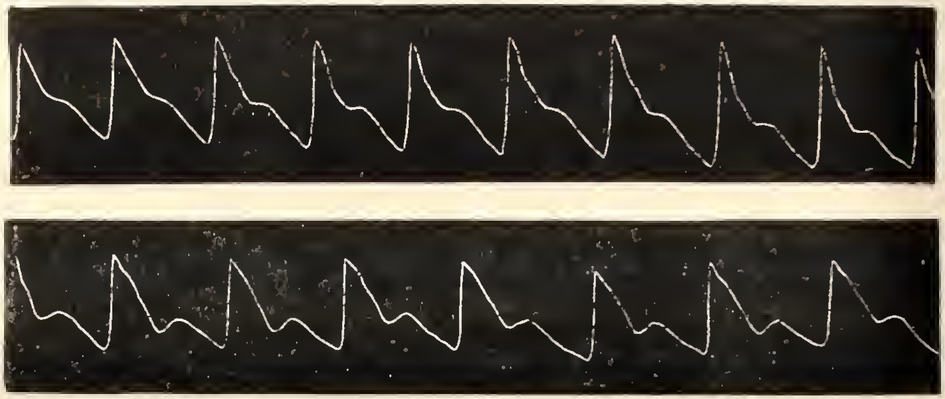


Fig. 56.—TRACINGS OF NORMAL PULSES.

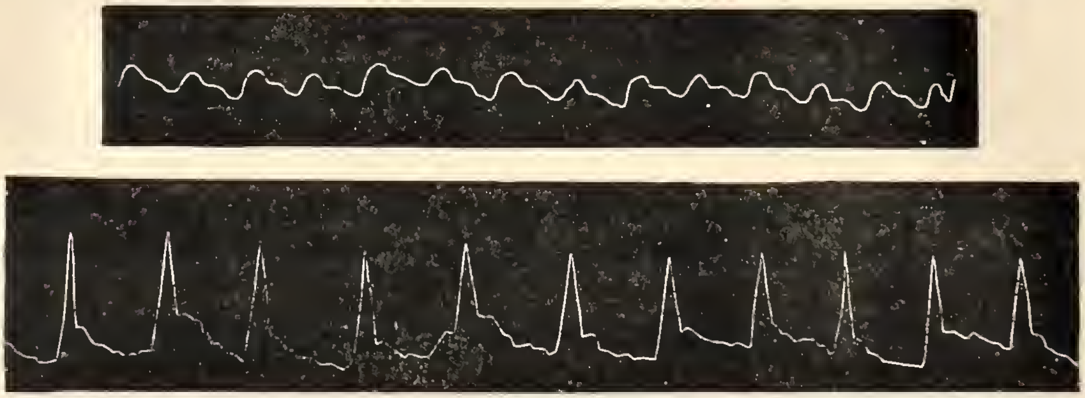


Fig. 57.—TRACINGS OF ABNORMAL PULSES.

Significance also attaches to the manner in which respiration is performed: men breathe chiefly by movements of the abdomen, and women by movements of the chest. In painful diseases of the chest, such as pleurisy, a woman will breathe almost entirely by movements of the abdomen, the chest walls being kept still so as to avoid the pain. On the other hand, in painful diseases of the abdomen men breathe with the chest, the abdomen being motionless; this is particularly observed in peritonitis.

Difficulty of breathing—dyspnœa, as it is technically styled—is a certain sign of something wrong, especially if it is accompanied with pain. Great difficulty of breathing is shown by increased muscular effort, by shutting and opening of the nostrils with each breath, and in children by a recession or drawing-in of the chest near the pit of the stomach. These symptoms are met with in asthma, in croup, and in obstruction of the windpipe by a foreign body.

The Skin.

Something may be learnt by observing the condition of the skin. In health it may be cool and dry or moist and hot, according to the amount of perspiration, but if it is both dry and hot the patient is probably feverish, and the thermometer will settle the question. Before the introduction of clinical thermometers physicians had to depend upon the sense of touch to decide this question, and by practice and experience a very fair amount of accuracy was attained in gauging the height of the fever. Great attention should be given to the presence or absence of skin eruptions, for in the infectious fevers this is a distinctive point in their recognition. Skin eruptions also occur as the result of dyspeptic conditions, of unsuitable food, and of many poisons. The skin over certain parts, such as rheumatic joints, may be much hotter than the surrounding surface, and is then an indication of local inflammation.

Temperature.

Much information is obtained in the recognition of disease by observing the temperature of the body. The human body, like that of all warm-blooded animals, has a temperature of its own, and this as an average is about 98·4° Fahr. It varies very slightly in different parts of the body, being about half a degree below the average in the armpit, and less than half a degree above it under the tongue. There is also a daily fluctuation of the body-heat of about two degrees, the lowest temperature being reached between 2 and 6 a.m., and the highest between 5 and 8 p.m. The effect of a meal, of active exercise, and of a hot climate is to raise the temperature slightly, perhaps to the extent of one degree. Apart from these natural slight variations the average temperature of the body while it remains in a state of health continues practically unaltered, and the effect of external circumstances is of the very slightest. In the extreme cold of the Arctic regions and the heat of the Tropics, in ice-cold water and in a Turkish bath, the body remains at the same temperature. This is the result of a most wonderful mechanism in the body by which heat can be dissipated or retained in accordance with the body's requirements. The mechanism is under the control of the nervous system, and acts through the skin. If the body is exposed to great heat the nervous system immediately becomes aware of the emergency, and so acts upon the blood vessels of the skin as to make them dilate or grow bigger; they then contain a much larger quantity of blood. And as a result, a free perspiration is set up, and an enormous amount of heat is given off by evaporation.

On the other hand, when the body is exposed to cold, and the heat of the body is in danger of being rapidly lost and the temperature lowered, an exactly opposite process takes place. The controlling nervous system immediately tightens up all the blood vessels of the skin, the blood is driven away from the surface into the internal organs, the loss of heat from the skin is thus directly prevented, and the changes by which heat is normally produced take place more rapidly in the interior of the body.

But interesting as these facts are, they are not more so than those connected with the temperature of the body *in disease*. Occasionally the very slightest deviation from health in some organ of the body raises the temperature quite appreciably, and a rise of temperature is often noticed as the first sign in some diseases, even before any symptom of illness is felt by the patient. It is extremely important, therefore, that careful observation of the body temperature be made in all cases of illness, for much information can thus be gained and valuable aid in diagnosis obtained. The temperature is raised in practically all infectious diseases, and in all inflammatory conditions. It is also raised in some exceedingly painful and rapidly passing affections, such as the passage of a gall-stone or of a stone from the kidney. Very high temperatures have been met with in sunstroke, lockjaw, and severe rheumatic fever, when 110° and even 112° have been recorded.

The opposite condition, in which temperature falls below normal, may be produced by anything that causes great depression or exhaustion of the body, such as severe hæmorrhage or diarrhœa, or shock resulting from operation or injury or acute pain. In starvation or great wasting due to disease, and in the exhaustion and collapse from such an affection as cholera, the temperature often falls very low, and in cholera has been recorded as reaching 9° and even 10° below normal.

The clinical thermometer will do much more than tell us that disease exists by showing an abnormally high or low temperature. If the various temperatures on each day of an illness are taken, and a record kept, it may be the means of teaching us what the actual disease happens to be. The way to keep this record will be explained in the chapter on Nursing, and it will be sufficient here to say that forms called charts are used on which to mark the various temperatures recorded by the thermometer at regular intervals of night and morning, or every three or four hours, each observation being marked on the chart in its proper place by a dot, and the various dots being connected by lines, so that the course of the temperature can be read on the chart at a glance.

What, now, will these charts teach us in the detection of disease? They will give us much information by disclosing the way in which the temperature rises. It may rise suddenly and rapidly, reaching a high level within the first twenty-four hours of illness. This is often the case in influenza, in scarlet fever, and more strikingly still in inflammation of the lungs. In the last complaint the change from apparently perfect health to severe illness is startling in its rapidity. The patient is suddenly overpowered with a sense of illness, feels cold all over, and is affected from head to foot with violent shivering. When the temperature is taken it is found to be very high, and continues to rise rapidly and continuously, reaching perhaps 104° in the first twenty-four or forty-eight hours. On the other hand, there are diseases in which the fever comes on quite gradually and insidiously. A feeling of mere malaise is experienced, and if the temperature should be taken it would be found but slightly raised, perhaps only a degree above normal, but it rises slowly day by day until finally a high and serious degree of fever is reached. This variety of fever is seen in its most characteristic form in enteric (typhoid), in which the temperature rises higher each day until at the end of a week it reaches its highest point, about 104° or 105°.

In some affections high temperature may continue for days with only about the same rise and fall as in health—that is, a little lower in the morning than in the evening. In this case it is called *continuous fever*. Or there may be a very decided fall in the morning and a very decided rise in the evening, when it is called *remittent fever*. Or, thirdly, it may fall each morning to normal or nearly so, and rise very high every evening; it is then termed *intermittent*.

A rise of temperature shows that there is some departure from health, but does not necessarily show that it is anything serious, for it may mean only that a cold has been caught, and it may entirely disappear after a free perspiration.

On the other hand, it is one of the most common symptoms in the anxious stage of "sickening for something," and forms one of the class of symptoms which are called premonitory or "warning."

The Tongue.

Much information may be obtained by an examination of the tongue, both as to the nature of the disease and as to the course it is likely to run. There are also some indications as to treatment that can be obtained by noting its condition. The examination of the tongue is usually completed when it has been looked at, but it is often helpful to feel it with the finger, especially to find out if it is dry and parched. The whole of the upper surface of the tongue should be seen, and the patient should open his mouth wide and put his tongue out as far as possible, so that the back part may be seen. A clean tongue does not, unfortunately, mean that the patient is healthy, for there are many complaints in which it remains quite unaffected, and curiously this is even the case in some attacks of indigestion, where we might well expect to find some definite alterations. Again, the tongue may be found dirty and furred in people who are quite well, some persons always having a dirty tongue even in perfect health, with good appetites and excellent digestions. A dirty, dry tongue in the morning is common in those who sleep with their mouths open, and may quite disappear after breakfast.

The most common indication of disease in the tongue is the presence of what is called "fur," which is due to a thickening of the surface layer of the tongue, the cells of which are held together with saliva and mucus often mixed with food particles, germs, and fungi. The fur may cover the whole tongue or only a part of it. Neuralgia of one side of the face, or inflammation of one tonsil, or irritation of the teeth, may cause a one-sided fur; or the tip and edges of the tongue may be quite clean and healthy, while the middle and back are coated. This is often a satisfactory indication when the whole of the tongue has been coated, for in a few days the remaining fur also will have disappeared.

The fur may be of different colours—white, whitish brown, yellow, yellowish brown, brownish black or black. The colour, however, is not of much help in diagnosis, for it may be due to some local cause, and may mean nothing more. Smoking or chewing tobacco will stain the tongue brown, blood will make it brown or black, and iron, whether taken in medicine or otherwise, will make it black.

A furred tongue almost invariably accompanies all feverish complaints, and must be looked upon as one of the symptoms of fever. The tongue is coated with a thick, creamy, moist fur in rheumatic fever; is somewhat the same, but tending to be browner, in gout; is thickly coated, too, in acute pneumonia. In scarlet fever it has so peculiar an appearance that it is called the "strawberry tongue," because of the little red spots which are present in the fur all over the surface.

When the tongue is dry and furred we have cause to feel anxiety, because it is in the later stages of severe diseases that this condition occurs, and it indicates severe exhaustion. It is commonly met with in bad attacks of typhoid fever, and when a similar exhausted condition occurs in other feverish diseases.

Apart from fever, fur occurs on the tongue in sick headache or megrim; after indulgence in alcohol to excess, and in most forms of indigestion and affections of the liver.

The opposite condition to fur may be found as a result of disease: instead of the surface membrane being thickened, it is thinned and almost absent. The tongue is then red, smooth, glazed, dry, sore and cracked, almost like raw beef—a condition which indicates long continued and severe fever.

The doctor will not fail to notice how the tongue is put out. In paralysis it may be impossible to move it at all, but if one side only is paralysed it can be put out with difficulty, and always turns towards the side which is paralysed. In many nervous complaints the tongue is tremulous, and also after alcoholic excess. In St. Vitus's dance it is put out with much hesitancy, and with a jerk, and is withdrawn suddenly as if afraid of a nip from the teeth.

In anæmia, general debility and long-continued indigestion the tongue is often large, broad, flabby, and marked along its edges with indentations formed by the teeth; whilst in acute peritonitis it is remarkably small and contracted. In diabetes, too, a disease in which the body is drained of fluid, it is red, clean, cracked, and dry.

The discovery of sore spots or ulcers on the tongue may open the medical man's eyes to many things. Spots of the kind most commonly met with are associated with indigestion, and are situated on the sides or tip of the tongue. They are exceedingly sensitive to touch or to irritating food. Besides these there are other ulcers distinct in appearance and of more serious import, for they may be caused by cancer or syphilis.

Lastly we must mention the conditions produced by the growth of parasitic fungi on the tongue. One of these conditions is the disease called thrush, a complaint of childhood, usually due to improper or insufficient food, but the same disease may occur in old people and in the later stages of wasting disease, when it is called aphthæ, and is of serious import.

These are some of the most important considerations in the examination of the tongue, and are enough to make us protrude that organ, at the doctor's request, with some trepidation, for we must feel that we are probably divulging many secrets of our internal economy, as well as, it may be, some information of our recent indulgences in the pleasures of the table.

The Eyes.

Indications of disease are often discovered by an examination of special organs, such as the eyes, larynx, nose, and throat, but these, to be complete, require special instruments and skilled hands, and a superficial observation only can be made by unprofessional persons. The condition of the *pupils* is important in some complaints. In poisoning by opium or morphia they are both very small—" pin point " as they are called ; in belladonna poisoning they are both very large ; in apoplexy or hæmorrhage of the brain they may be unequal, one contracted and the other dilated ; whilst in persons who are stunned they are often both very large.

Loss of Weight.

The weighing machine is a very useful instrument in recognising disease and marking its progress. *Loss of weight* is usually caused by some definite organic disease. In childhood it is very common, and in most cases depends upon derangement of the digestive organs, in which vomiting and diarrhœa are marked symptoms. It is important that a child's weight should increase uniformly and continuously, and if it does not something unsatisfactory exists, which should at once be inquired into. A slight deviation from health will sometimes check a child's growth, such as the troubles of vaccination, and a child may often hardly increase in weight for ten days after this little operation. In other cases the food should be suspected, for bad or insufficient food causes wasting both by starvation and by digestive troubles.

Loss of weight in an adult is if anything more important, for it almost invariably shows some serious organic disease. It occurs in affections of the digestive organs, such as gastric ulcer, chronic dysentery, or diarrhœa. But the two principal diseases in which marked wasting occurs are consumption and cancer. In the former, if the regular weighings show loss of weight the patient is going down-hill, and it is only when, as the result of treatment, the loss of weight is checked, and the body gradually begins to grow fatter and heavier, that we can feel that any real progress is being made. Nothing shows progress in consumption so definitely as increase in weight.

If, again, we have a friend suffering from a lump or tumour the nature of which is obscure, cancer must always be in our minds as a possibility, but if, by taking the weight regularly once a week, we find that it is increasing, however slowly, we may satisfy our minds that whatever the swelling may be, it is not cancer, for no symptom is more definitely connected with this dire disease than loss of flesh.

Another very useful means of diagnosis that we have at our disposal, and the full value of which we have not yet realised, are the X-rays.

X-rays.

These light rays are produced by electricity in a glass tube which has been partially exhausted of air (i.e. a partial vacuum). They were discovered in 1895 by Professor Röntgen, and their peculiar property is that while they are able to pass with great freedom through many opaque substances, such as wood, flesh and paper, they do not pass through metal and bone. By means of these rays a shadow picture of the whole of the skeleton of a human body can be thrown on a screen, and any abnormality, such as bony outgrowths or broken bones, can be distinctly seen. Any metal body buried in the flesh or contained in the hollow internal organs also becomes visible, and we can quite easily recognise a bullet in the muscles, a penny in the stomach, or a splinter of bone in the flesh. The value of this aid to diagnosis can easily be understood.

But although X-rays pass through the flesh, they are partially absorbed, and the transparency of substances to these rays depends upon their density. This is plainly shown when a shadow picture of the body is thrown on a screen, for although the bones throw a dark shadow, a dense muscular body like the heart throws shadows also, though fainter ones. It is easy, therefore, to see the heart distinctly beating inside the chest, and the large masses of muscle in the limbs.

Stones in the kidney and bladder can be discovered by the X-rays, and also gall stones, though much less easily. The use of these rays is growing in importance rapidly, and there is little doubt that they will prove of great assistance in the recognition of many obscure complaints, one of the most important being the deposits in the lungs produced by tubercle bacilli, which in time may more readily be seen by aid of the radiograph than discovered by the other means at our disposal.

Prognosis.

The art of prophesying the course and ultimate result of an illness is called prognosis. A correct prognosis cannot possibly be given without having first formed a correct diagnosis, and even then it depends so much upon the individual peculiarities of each patient and many other concomitant circumstances, that it is only those who have had great experience who are in a position to express an opinion with any degree of authority.

CHAPTER XXXVIII

METHODS OF CURING DISEASE—TRUE AND FALSE

General Principles—Treatment by Medicines—Hydropathy—Mineral Waters—Exercises—Massage—Electricity and Light—Rest—Weir-Mitchell Treatment—Change of Air—Climate—Hypnotism—Homœopathy—Faith Cure—Bone-setters.

GENERAL PRINCIPLES

Considering that the chief aim and object of all medical treatment is to give relief to suffering and cure disease, this chapter is of especial importance and interest. We learn the causes of disease, the course it runs, and the means of recognising it with the one purpose in view of treating it successfully, and now we come to the various means which are at our disposal to effect this purpose.

We have already discovered that Nature has a strong tendency to retain the body in a state of health, and when disease finds an entrance to cast it out and restore the affected structures and organs to a normal state. A ceaseless war is being waged in our bodies between disease and certain protective organisms, the leucocytes or white blood cells, also called phagocytes, because they devour the invading microbes.*

The fight between the human organism and the attacking microbes has been compared to a struggle between a citizen and a burglar, whilst the doctor is like a policeman coming to the rescue. The policeman draws his truncheon and hits out, and if the light be dim and objects are seen obscurely, he is as likely to hit the citizen as the burglar. This condition of affairs is very analogous to what happened when knowledge of disease was obscured with superstition and mystery; the treatment employed sometimes did much harm, although at other times much good.

This brings us to the methods of treatment that may be employed. In the earliest history of the healing art all sorts of measures were resorted to against disease, and if it yielded during the use of any particular means, that agency was supposed to have cured the trouble, and was handed down as recommended by experience. But often the treatment in other cases did much harm, and as knowledge of the essential nature of disease—that is, of the cause of it—was wanting, no definite guides for treatment existed.

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* *See* Vol. I., p. 6.

Empirical Method of Treatment.

This plan of treating disease founded on experience is called the empirical method. If carried out in ignorance it does much harm, as is shown by the excessive blood-letting and the overdosing of a bygone age, but if aided by accurate knowledge and discrimination it may lead to very satisfactory results. An example will make this clearer. It would be natural, judging from experience of the general results of the administration of opium, to say that a dose of this drug would cure a colic, for it would ease the pain, but medical knowledge would say, "No; opium will block the bowels, but a purgative will clear them, and will both ease the pain and remove its cause." Many such examples might be given, but this one is enough to show the drawbacks of empirical treatment, and the danger of amateur doctoring unless backed by knowledge. It is a matter of everyday experience that kind friends recommend remedies or prescriptions of their own, which they have found to do them good in what seemed to be similar circumstances. But though the symptoms may be similar, the circumstances differ; the cause of the complaint may vary, and the treatment which gave relief in the one case is as likely as not to do harm in the other.

As we have suggested, the empirical treatment is not altogether bad, and we have to employ it in a certain number of cases still, but the light of increasing knowledge is constantly shining into the dark places of medicine and showing us the causes of disease and the true means of remedying it.

The Rational Method.

The really scientific mode of treatment requires that we should recognise the definite cause of a disease, and be well informed as to the actual effects of the remedies that are applied to it. This is called rational treatment.

Some doctors believe that the restorative power of the body should be allowed entire freedom of action, and that any special treatment they may employ will only retard it. They therefore do nothing but employ the *expectant treatment.* In cases where there is no real hope of curing the disease, it is necessary to employ measures to soothe the patient, to lessen his sufferings, to make him as comfortable as possible, and to prolong his life, and we then employ *palliative treatment.* With certain practitioners of medicine most forms of disease are considered to be dependent upon a condition of weakness and lowered vital power, and they turn to *stimulant treatment.* This is very valuable in certain cases, but cannot be considered right in all. The opposite to this is the *antiphlogistic treatment ;* it includes low diet, bleeding and purging, and is very useful in the acute inflammatory diseases, its name meaning " against fever." It was the common routine not so very long ago to bleed and purge in most cases of illness, and the result was in many instances most disastrous. There are few nowadays who would be the better for an annual bleeding, or for the enormous doses of pills and potions that used to be thought the right thing. Purging and sweating are of course still employed in suitable conditions, and are excellent measures for ridding the body of effete or poisonous matter.

Other Forms of Treatment.

We are fairly safe if we follow Nature's guidance and help her in her efforts, but we are liable to be misled in certain cases, and may go wrong by blindly humouring a patient's desires. His appetite and longings should certainly not be entirely disregarded ; a thirsty patient should be allowed to drink, and a hungry one to eat, but only when our experience proves that the eating and drinking can do no harm. A sufferer from diabetes will long for bread, and an enteric fever patient will crave for a solid meal, but our knowledge of these diseases will make us forbid such luxuries, for death may be in the indulgence.

TREATMENT BY MEDICINES

A very important part of the medical treatment of disease is filled by the employment of drugs, but it must be understood that it is only part and not the whole of such treatment. It is the fashion amongst certain people, to a great extent the result of ignorance, to profess scepticism as to the efficacy of drugs ; both patients and doctors are sometimes pleased to say that they do not believe in drugs, and sneer at those who place faith in them. This, especially among doctors, is the result of the excessive dosing that was common in the past, when every patient was stuffed with all sorts of filthy concoctions; but no reasonable person can really disbelieve in the action of medicines when he comes to observe their effects. Who can disregard the sedative effect of a dose of morphia on an individual suffering acute pain, or the soothing action of bromide of potash on an excitable and irritated nervous system, or the tonic, steadying effect of digitalis on a "runaway heart," or the immense relief obtained in rheumatic fever from salicylate of soda, in ague from quinine, in anæmia from iron, in constipation from blue pill and sulphate of magnesia?

Drugs are divided into separate classes according to their effects on the system, as revealed by experiment and experience. For instance, tonics improve the condition of the blood and the nutrition of the body; sedatives and narcotics soothe the nervous system and produce sleep; laxatives and purgatives increase the action of the bowels; diaphoretics the action of the skin; diuretics the excretion of the kidneys; and expectorants the discharge of mucus from the respiratory passages.

Where Drugs Come from.

Drugs are imported from all quarters of the globe, almost every country, civilised and uncivilised, furnishing some contribution for our use. Senna is obtained from India, opium from Asia Minor, Egypt and Persia, jalap from Jalapa in Mexico, quassia from Jamaica, bark from the Andes, ipecacuanha from Brazil, musk from Central Asia, while aconite, digitalis, stramonium, and colchicum are supplied by our own country. The animal, vegetable and mineral kingdoms yield each their quota. Cod-liver oil, pepsin and cantharides come from animals; aconite, belladonna and opium from vegetables; iron, arsenic, mercury and sulphur from minerals. Many other drugs of popular use are manufactured in the chemist's laboratory, such as antipyrin, sulphonal, and nitrite of amyl.

Vegetable medicines are taken from various parts of the plant. The leaves are used in foxglove, monkshood and senna; the root in ipecacuanha and gentian; the wood in quassia; the seed in strychnia; the bark in cinchona; the resin in myrrh and the balsams; the fruit in tamarinds and prunes; the fruit oil in anise, and the flowers in chamomile. From these various vegetable products the active principles are extracted in various ways, and the preparations thus produced have received names according to the method employed. A *decoction* is a watery solution of a medicinal substance prepared by boiling; a *tincture* is made by extracting the drug with spirit, which is usually alcohol; an *infusion* is prepared with boiling water; and the *spirits* consist of the drugs dissolved in strong alcohol.

Alkaloids.

Certain very strong drugs called alkaloids are extracted from plants, and form the active principle of many other drugs. Some of the best known and most frequently used alkaloids are morphia, atropia, strychnia, quinia, aconitia, caffein and digitalin; they are deadly poisons, and their power on the organism is shown by the minute doses in which they are used. Thus the dose of morphia is $\frac{1}{8}$ to $\frac{1}{2}$ grain, of atropia $\frac{1}{250}$ to $\frac{1}{100}$ grain, of strychnia $\frac{1}{30}$ to $\frac{1}{12}$ grain, of aconitia $\frac{1}{100}$ to $\frac{1}{50}$ grain, of digitalin $\frac{1}{60}$ to $\frac{1}{30}$ grain.

Idiosyncrasy.

The effect of drugs varies in the most extraordinary way in different individuals. An ordinary dose taken by one person may have no very marked effect, while the same dose given to another may cause violent symptoms of poisoning. A dose of 4 or 5 grains of iodide of potash may be taken by most people without their feeling any effects from it, but in others even a much smaller amount produces symptoms of a bad cold, inflamed and watery eyes, sneezing and running from the nose, with headache and swollen eyelids. A small dose of belladonna, harmless to some, is poisonous in others, causing dryness of the throat, thirst, difficulty of swallowing, dilated pupils, indistinctness of sight, a general red eruption, and many other uncomfortable symptoms. This peculiar sensibility of some individuals, called an idiosyncrasy, is of considerable importance in the administration of medicines. It is, however, very common for people to say they cannot take certain drugs when they really can, and one has to accept such a statement with a good deal of doubt until it is proved to be a fact, for the doctor finds it exceedingly unfortunate in many cases to be limited in the medicines he can employ.

Idiosyncrasy is met with in other conditions besides the taking of medicines. Some people are peculiarly affected by sights and odours. The smell of the powder of ipecacuanha brings on in certain persons a violent attack of asthma; that of roses or apples a feeling of horror and fainting; that of civet, musk or ambergris an attack of convulsions. The sight of certain objects—animate or inanimate—has a correspondingly strange effect on some individuals. Swooning may occur at the sight of a beetroot or of blood; James I. dreaded a drawn sword, Tycho Brahe fainted at sight of a fox, Henry III. of France at that of a cat, and Marshal d'Albert at that of a pig. Again, certain foods act as poisons on some people, but are harmless to others. Eggs, sugar, honey and fish may each cause pain, nausea and vomiting, and strawberries have been known to bring on intense nervous shock.

It was once the fashion to include in prescriptions an enormous number of different drugs with the idea that at any rate one might "touch the spot"; but this was a counsel of despair, due to ignorance of both the action of the medicine and the nature of the disease. Most doctors now decide upon the drugs likely to be beneficial, and use one or two active medicines only in a prescription. They then decide in what form it shall be taken—mixture, pill or powder, as may seem most appropriate. If a mixture is decided on they order the drugs they desire, add some flavouring to hide the disagreeable taste, and some water or other fluid to dissolve or dilute them.

There are many methods by which drugs may be introduced into the body. They may be administered (1) by the mouth, (2) by the bowel, (3) by the respiratory mucous membrane, (4) by the skin, (5) by injection under the skin.

Methods of Administration.

1. Medicines given by the *mouth* may be in the form of mixtures, pills, or powders, and there are special advantages connected with each. In a mixture the drug is usually in solution, and is quickly taken up by the stomach, and passes into the blood. There are the disadvantages that the patient tastes the drugs, which are often disagreeable, and that the digestion is liable to be upset.

Unpleasant medicines may be taken in the form of pills, in which they are combined with a suitable basis, and covered or coated with some material which renders them tasteless. The materials which are most commonly employed as a basis are syrup of glucose, confection of roses, soap and extract of liquorice. Pills may be varnished, covered with gelatin, pearlcoated with French chalk and gum, or sugar-coated, but these methods are giving place to silvering or gilding. When it is desirable that the drugs contained in the pills shall not act until they have passed out of the stomach into the intestines, they are coated with some material which is insoluble in the acid gastric juice, but is soluble in the alkaline fluid contained in the bowel, and for this purpose keratin and salol are employed. The action of drugs taken in pill form is delayed as compared with those in fluid medicines; for this reason purgative pills should be taken at bedtime, or even early in the evening. The dinner pill is an aperient pill which has received its popular title from the time of its administration. Purgative pills often contain strong mineral drugs, especially mercury, and should be followed the next morning by a saline draught to carry these out of the body and prevent any injurious constitutional effect. Iron is often given in the form of pills to avoid its harmful effect upon the teeth.

Another form in which strongly flavoured drugs are taken is that of cachets, cases made of soluble material, of a shape easy to swallow. Tabloids and tablets are also of common use ; they are shaped like little lozenges, are made of compressed drugs, have no taste, and are of definite dosage, each tablet containing a uniform and medium quantity of the drug or drugs.

2. Medicines administered by the *bowel* are in the form of injections or suppositories. Injections, if used to clear out the bowel, are given in large quantities, 1 pint or more, but if employed to introduce drugs into the system should be much smaller—from 1 to 4 ounces. Opium and other sedatives are given as injections, and also nutritive substances such as beef tea, milk, etc. Glycerine is sometimes given by the bowel for its aperient effect.

Suppositories are little cone-shaped masses of wax containing active drugs, and are introduced into the bowel either for their local effects (glycerine as an aperient, hazeline as an astringent), or for their general effects (morphia as a sedative).

This method of administering food and medicines is of the greatest value when the stomach is very irritable or vomiting is troublesome, and many a life has been saved by its adoption.

3. In the form of inhalations, sprays, smokes and vapours, drugs are rapidly absorbed by the *respiratory mucous membrane*. They are useful also in many complaints besides those of the respiratory organs.

4. Absorption by the *skin* of drugs dissolved in water takes place in very small quantities, but if they are mixed with fatty substances in the form of ointments they are freely taken up and inunction, as the method is termed, is very commonly used to introduce mercury and iodine into the system, so that they may not have to pass through the stomach. Sedative drugs also are introduced in this way in the form of an ointment or mixed with glycerine.

5. The great advantage of administering medicines by *hypodermic*

injection is that the effects are obtained with great rapidity. The influence of morphia given for the alleviation of pain may be observed within a minute. Ergotin to arrest bleeding, strychnia to stimulate a fainting heart, and alcohol as a rapid restorative are some of the drugs used in this way.

HYDROPATHY

This is the name given to the treatment of disease by water, and is a most useful method when employed with proper care and under medical supervision. Its value was well known to the ancients, and its virtues were extolled by Hippocrates and Galen. It has been used at intervals ever since, but it was only founded as a system in 1820 by an Austrian farmer named Vincent Priessnitz, who combined the various rules and procedures which had previously been in use, and very sagaciously allied with them exercise, fresh air, and restricted diet. Unfortunately he was quite devoid of medical knowledge, and taught that disease was due to acrid humours in the blood which had to be diluted and extracted by water. It is not surprising therefore that hydropathy fell into disrepute. But of late years its value has been fully recognised when it is employed in suitable cases. Many hydropathic establishments have been opened in various parts of the country, and equipped with all the necessary apparatus for the use of water in the form of baths, douches, compresses, packs, and sprays, and although many of these have somewhat altered their character from bathing establishments to hotels, yet hydropathic treatment can be had in such institutions by those who require it. The treatment cannot be borne by all persons, and it must be looked upon as an adjuvant to medicinal and dietetic methods, with which it should be combined. It is useful in many chronic diseases, such as gout, rheumatism and sciatica.

Baths.

The ordinary bath is useful for the treatment of disease as well as for the maintenance of personal cleanliness, and its effects on the body vary much according to the temperature of the water. Of a cold bath the temperature is under 70° F., of a tepid bath from 85° F. to 95° F., of a warm bath from 96° F. to 104° F., and of a hot bath from 105° F. to 114° F.

Cold baths are sometimes used in cases accompanied by high fever; the patient is placed in water at about 97°, and the temperature is gradually cooled down to 60° or lower, when he is quickly dried and put back to bed. This involves a good deal of movement, and a very similar but a less violent measure is to wrap the body in a sheet wrung out of cold water, which is called the "wet pack."

Tepid baths are without much therapeutic action. They have, however, a distinctly soothing effect on the nervous system. They are useful also in chronic skin diseases, for which they are usually medicated, and are often continued for many hours at a time. The bath should be followed by friction of the skin with a rough towel, and will then do much good by stimulating the action of the skin, clearing the glands of retained secretion and removing the dead scales of the epidermis. The body generally, too, is benefited by this process, as the circulation is stimulated and the action of the various organs encouraged.

Warm baths are used medically to relieve muscular spasm, as in colic or convulsions, and in cases of rheumatism and gout, as well as to encourage the action of the skin.

Hot air and vapour baths are very useful. They may be taken at home or at regular bathing establishments. In the *Turkish bath* the bather, clothed simply with a loin cloth and slippers, first enters a room—called the tepidarium—the air of which is heated to about 120° F., and having become well warmed he enters the hot room or calidarium, heated to 220° F. or higher. Here he stays until his body becomes bathed in sweat. He next enters the lavacrum, where he lies down and is shampooed, and then washed with soap and water, a process which extracts from his skin an astonishing amount of dirt and scales. He is then douched with water which is gradually cooled, and passes into the cooling room or frigidarium, where he lies for a time enjoying a cup of coffee, until he has recovered his ordinary temperature, and is fit to go into the open air. The free perspiration induced by the Turkish bath is found useful in catarrh, in chronic rheumatism, and many other conditions; the nerves are soothed, muscular power is increased, and chronic joint pains are lessened.

Hot dry air is sometimes applied locally. The affected limb is placed in a metal cylinder in which the air is heated up to 180° F., or even more, and the stiffened joint becomes loose and supple. The stiffness returns after it has cooled but is not so bad as before, and by continuing the treatment a fairly successful result is usually obtained.

In the *Russian bath* the room is filled with steam and the moisture makes it much more trying to the system. The bather ascends steps, and the higher he goes the hotter is the atmosphere. In Russia bathers are accustomed to rush out of the bath and roll themselves in the snow.

Medicated Baths.

The most important medicated baths are those of the natural mineral waters and sea-water, but many others are specially prepared by medical orders for the treatment of disease at the patient's own house.

A salt water bath is obtained by adding sea salt, of which Tidman's is a popular form, to water of the temperature ordered, in the proportion of about ¼ pound to 1 gallon. It is an active remedy, and its uses are similar to those of sea bathing.

A *mercury bath* is sometimes used in syphilis and skin affections. Two drops of hydrochloric acid and 6 grains of the strong poison, corrosive sublimate, are used for each gallon of water.

An *alkaline bath* is made with carbonate of soda, ¼ ounce to 1 gallon, or carbonate of potash, one teaspoonful to a gallon. It is useful in skin diseases, and for steeping the painful part in attacks of rheumatism and gout.

Sulphur baths also are valuable in the treatment of skin affections; ¼ ounce of sulphuretted potash in each gallon.

In certain liver complaints an *acid bath* is found beneficial, but it is more often employed as a footbath or for local application. Half an ounce of dilute nitro-hydrochloric acid to 1 gallon of water is an average strength, and a wooden or earthenware vessel must be used.

In certain irritable states of the skin, especially in acute eczema, plain water is most unsuitable, and a *bran bath* is useful. Two ounces of bran for each gallon of water to be used should first be mixed with a small quantity of boiling water, and then well stirred into the water in the bath.

Ozone or *seaweed baths* may be used instead of sea baths. They are prepared by adding a decoction of seaweed or chopped up seaweed to the bath water in sufficient water to make it glutinous.

The homely remedy of a *mustard bath* consists of a handful or two of mustard powder well stirred into a bathful of hot water, or, to be more exact, 1 ounce of mustard to every gallon of water.

Pine baths are provided in many of the hydropathic establishments, and are useful in hysterical, rheumatic and gouty affections. They may be prepared by putting about 1 pound of the extract of pine leaves, with a little of the essence of the same, in a full-sized bath of hot water.

The effects of sea-bathing are similar to those of the ordinary cold bath already mentioned, but the invigorating and stimulating effect is greater from the presence of the salt, from the movement of the water, and from the combination with them of swimming exercise. A sea bath should never be taken immediately after a full meal, but should be indulged in before breakfast, after a glass of milk and a biscuit, or two or three hours after a meal, and it is well for it to be preceded by a short walk. It is also unwise to enter the water while the body is cooling from free perspiration, as in this condition there is more danger of a chill than when the body is perspiring freely. The greatest benefit is obtained from sea-air and sea-bathing by those who are scrofulous or who have tuberculous tendencies, enlarged glands, diseased joints, chronic and muscular rheumatism, or hysterical affections. Many cases of anæmia, indigestion and convalescence from acute disease rapidly improve under their influence and those who are prone to catarrh, and "catch cold" constantly may be strongly advised to adopt this form of treatment.

Sea-bathing.

MINERAL WATERS

Mineral waters and their use in the treatment of disease are a very important subject, and it is impossible to discuss the matter fully in this work. We shall, however, attempt to give briefly the chief varieties of water, their uses, and the most important of the places where they can be obtained.

The Greeks and Romans had the greatest faith in the curative power of mineral waters, and the present-day physician has not had cause to form a different opinion. The waters contain mineral substances in solution, and are classified roughly according to their chemical composition. They are used internally in doses varying from tablespoonfuls to pints, but usually are taken by the tumblerful; they are also employed externally in the form of baths, douches, and sprays.

The results of chemical analyses of mineral waters take us by surprise, for although many such waters are undoubtedly very active agents in the treatment of disease, yet the amount of mineral salts they contain is extraordinarily small, and if the same doses were dispensed by a chemist in the form of a medicine they would practically have no effect whatever. The laboratory of Nature evidently contains secrets that are quite unknown to the

Chemical Analysis.

skilled chemist. Although we do not dispute the fact that the waters have very decided effects, yet we are sure that the great benefit derived by many who visit mineral spas depends considerably upon several other important conditions. Briefly stated, these are the large amount of water taken daily, its solvent action upon the waste products of the body, and its stimulating effect on the excretory organs ; the excellent habits and hours which are adopted—the early rising, the regular exercise, the limited meals at fixed and suitable hours, the freedom from home cares, and the change of air and scene. Perhaps the simplest way to exemplify this would be to give the daily routine of one who visits Carlsbad for the sake of his health, for Carlsbad is fairly typical of watering places, although the régime and supervision there are more strict than at many others. The patients get up at about six o'clock in the morning, and go out without any food to the spring, where they fill their glasses, and walk round and round the promenade for nearly an hour, at every few steps taking a sip of the water. In this way they get through three or four glasses in the course of their walk. They then go to a confectioner's and have a cup of coffee and one or two small rolls, which they eat without butter. After the mid-day meal they rest awhile, go for another walk in the afternoon, take some more water, have an evening meal and go to bed early. The food eaten at meals is strictly regulated according to their complaints, and even at the restaurants they cannot buy unsuitable food whilst they are under treatment.

Carlsbad.

In many cases bathing is of even greater importance in the treatment than drinking the waters. The baths in the great majority of places are taken between breakfast and midday dinner, and are never allowed until some time after a full meal. The length of the bath varies with the disease, the nature of the water, etc., and is decided by the local doctor, who should always be consulted, and who gives definite rules of bathing, drinking, and diet. A bath may vary from a few minutes to many hours. At Leuk, in Switzerland, the patients practically live in the water, taking their meals and playing their games on little floating tables.

Bathing in Mineral Waters.

The best time for taking the waters is from May to September, the season varying slightly at the different spas, and the length of the course spreads over a period of from three weeks to two months.

The action of mineral waters varies according to their chemical composition and temperature, and the influence of the spas at which they are found depends upon situation, elevation, climate, geological formation and other circumstances.

There is some difficulty in classifying mineral waters, but the following, though a rough, is a fairly useful list of the chief waters according to their special characters and mineral constituents :—

1. Alkaline waters.
2. Bitter waters.
3. Saline waters.
4. Sulphurous waters.
5. Bromine and iodine waters.
6. Iron waters.
7. Lime waters.
8. Indifferent thermal waters.

1. *Alkaline waters* may be divided into two groups, (*a*) simple alkaline acidulous and (*b*) alkaline saline waters. (*a*) The simple alkaline acidulous waters contain a large quantity of carbonate of soda, and usually much carbonic acid. Vichy has hot springs, Bilin and Bachingen cold. In this country the waters are found at Clifton, Malvern and Shap. They are employed for all forms of acidity, gout, gravel and uric acid troubles, indigestion, sluggish liver, gall-stones and chronic mucous catarrh. (*b*) Alkaline saline waters contain also a large amount of common salt. There are hot springs at Ems ; cold springs at Selters and Salzbrunn. They are found in this country at Sandrocks, Isle of Wight. These waters are useful for chronic catarrh of mucous membranes generally. They are not so depressing as the pure alkaline waters, nor do they tend to produce emaciation.

2. *Bitter* or *sulphated waters* contain sulphate of soda and magnesia ; a sub-division called alkaline sulphated waters contain also carbonate of soda and common salt. They occur in this country at Epsom, Leamington, Cheltenham, Scarborough and elsewhere. Sulphate of magnesia is called in England "Epsom salts," from the presence of this salt in the spring at Epsom. The foreign springs include Apenta, Hunyadi János, Friedrichshall, Marienbad, Pullna, Seidlitz, Kronthal and Carlsbad. They all act as aperients, their power depending upon the amount of salt contained in them.

3. The *saline waters*, whose chief ingredient is common salt, sometimes combined with carbonic acid, occur in numerous places in these islands, among others at Antrim Spa, Ashby-de-la-Zouch, Builth,

Cheltenham, Crieff, Droitwich, Dunblane, Harrogate, Leamington, Malvern, Middlewich, Moffat, Nantwich, Newtondale, Peebles, Pitkeathly, Rothesay and Woodhall Spa. The springs at Droitwich are the strongest brine springs in the world. Those at Homburg, Kissingen and Kreuznach are among the best-known Continental springs. These waters are chiefly employed in cases of rheumatism, gout and scrofula, and in liver complaints. They improve the digestion and encourage the secretions. In the form of baths they stimulate the skin, improve its tone and encourage the nutritive processes of the body.

4. *Sulphurous waters* contain sulphur in the form of sulphides or sulphuretted hydrogen, and have a most offensive smell, like rotten eggs or decaying vegetables. Builth, Cheltenham, Harrogate, Leamington, Llandrindod Wells, Moffat, Strathpeffer, all have sulphur waters, and many of them are visited by large numbers of persons during the season. The most important hot springs abroad are those at Aix-la-Chapelle, Baden, Barèges, Aix-les-Bains and Bagnères de Luchon. These waters are used for drinking, for bathing and for inhalation in chronic skin diseases, chronic gout and rheumatism in which the joints are stiff and swollen, chronic catarrh of the respiratory organs, and sluggish conditions of the liver.

5. The *bromine and iodine waters* contain, besides common salt, bromides and iodides of sodium, potassium and magnesium. They are met with at Woodhall Spa in this country, and at Kreuznach and many other places on the Continent. They are employed for both drinking and bathing, and are recommended for chronic inflammatory troubles, especially those connected with scrofula, that is, a tendency to tuberculosis.

6. *Iron waters* or chalybeates are met with in an enormous number of places both in Great Britain and on the Continent. They contain iron in a peculiar form called a protoxide, which is only present in very small quantities—from 8 to 15 parts in 100,000, and yet its action is undoubted, and is often found to be more efficacious than much larger doses taken as medicine. Iron is not absorbed by the skin at all, and very little of what is taken is absorbed by the digestive organs, and yet cases of debility, of anæmia, and many female complaints are enormously benefited by a course of the iron waters. Some of the health resorts most visited on account of their chalybeate springs are Schwalbach Spa, St. Moritz, Marienbad and Loèche-les-Bains. In this country, springs

of this group are found at Aberystwith, Bath, Builth Wells, Burnham, Cheltenham, Harrogate, Holywell, Holywood, Kilrush, Leamington, Llandrindod Wells, Llanwrtyd, Scarborough, Tenby, Tunbridge Wells, and elsewhere.

7. *Lime* or *earthy waters* contain carbonate or sulphate of lime. The latter is, however, not desirable if present in at all large quantities. These waters are useful in a variety of complaints. Wildungen and Contrexéville are resorts for stone in the kidney and gravel, and diseases of the urinary organs generally; Loèche-les-Bains for chronic skin diseases, and Bath, Brieg, Vittel for gout and rheumatism, as well as for skin diseases. The indications for their use are conditions due to acidity, such as dyspepsia, diarrhœa, inflammation of the bladder, stone and gravel, some forms of eczema and other skin affections. They are useful also for some diseases of bone, including rickets, in which lime salts are present in the body in deficient quantity. In this country the waters are met with at Bath, Buxton, Cheltenham, Clifton, and Matlock Bath.

8. *Indifferent thermal waters* contain no particular ingredients, but are of various temperatures, and are used for bathing and hydropathy generally. Cold waters—Malvern 42°, Matlock 68°, Buxton 82°, Clifton 86°, Wildbad 80° to 97°, Schlangenbad 85° to 92°. Hot waters—Gastein 95° to 118°, Bath 120°, Vichy 106°, Baden-Baden 155°, Plombières 156°, Wiesbaden 160°, Carlsbad 162°. They are used in the form of baths in chronic rheumatism and gout, in chronic skin diseases, in neuralgia and other prolonged painful affections, as lumbago and sciatica. Taken internally they stimulate the liver and digestive organs. They also strengthen the nervous system, and are useful in hysteria, in general debility, and in convalescence from acute illness.

Most of the various classes of mineral water can be found in British health resorts, and thus the disadvantages of a long and expensive journey may be avoided, but some of the waters can be taken with much more benefit abroad, where greater preparations are made for visitors, and more thought and care are given to the cures. Those unable to visit the spas can obtain at home a large number of the most useful waters, which are bottled at the springs and sent to England in great quantities.

EXERCISES

Exercise is of much value in the treatment of disease. It has been found by experiment that the effect of exercising the muscles is greatly to increase the amount of blood which flows into them through the arteries and which flows out of them through the veins. This is very evident when blood is being " let " from the vein of the arm, for when the limb is kept at rest the blood flows gently and continuously, but if the muscles are put into action, as in clenching the fist or bending the arm, it spurts out freely at each contraction.

The flow of lymph is also encouraged through the muscles by their exercise, and its amount increased. When muscles are imperfectly exercised they are unable to get rid of their waste products rapidly, and these are liable to accumulate and cause fatigue and weakness, but exercise has the salutary effect of squeezing these out of the muscles and driving them onwards into the lymphatics. These substances, although injurious to the muscles, have a beneficial effect upon other parts of the body, and are known to act as stimulants to the brain and nervous system. This knowledge is put into practice when we use the extract of muscles in the form of beef-tea, for its stimulating and invigorating action on the general system. Consequent upon these changes the muscles are developed and their tone is improved, but care must be taken to limit the amount of exercise. Excessive exercise, instead of being followed by benefit, produces exhaustion and fatigue, and is injurious.

The increased rapidity of the circulation through the muscles has a beneficial effect on the body generally. The nutritive changes are encouraged, the excretion of waste material is increased, and the appetite improved. The much larger amount of blood in the active muscles must necessarily mean a smaller quantity in other parts of the body, and gymnastic movements can therefore be employed for what is technically called their depletive or derivative action. Thus exercise of the arms and legs draws away or depletes the blood vessels of the trunk.

The Ling System.

The systematic use of gymnastic exercises as a form of treatment is chiefly due to the work of Professor Ling (1776–1839), a member of the Royal Swedish Academy. His name is closely associated in England with this method, and his countrymen have to a great extent monopolised its practice. Swedish exercises are divided into three classes :—

1. Active movements, executed by the patient himself. These consist of (*a*) free movements or those carried out by the patient's own effort without the aid of an assistant, and (*b*) restricted movements in

which steadiness and limitation are secured by means of fixation and support either from apparatus or from an assistant. The effects of these movements are similar to those produced by class 2, but in a lesser degree.

2. Resisted movements, executed by the patient or an assistant against resistance. These are of two kinds—(*a*) those in which the assistant resists while the patient carries out the movement by his own effort, and (*b*) those in which the assistant carries out the movements while the patient exercises resistance. The effects of these exercises have been described when speaking of muscular exercises in general.

3. Passive movements, performed by the assistant on the patient, without the latter offering either resistance or assistance. These are used in the manipulations of stiffened and injured joints, and in the processes included under the denomination of massage.

Swedish exercises may be employed to maintain the body in health and the general muscular system in good condition ; they are also of great value in the treatment of many diseases.

In faulty development of various parts of the body much benefit may be derived from a course of gymnastics carefully carried out. Breathing exercises improve flat and contracted chests and obstructed nasal passages.

Exercises in Paralysis.

In cases of paralysis exercises keep the affected muscles from wasting, and maintain their tone and nutrition whilst the diseased part is being repaired. If the paralysed muscles are left unattended to, they are liable to waste and degenerate to such an extent that after the removal of the cause their power is irretrievably lost.

In treating paralysis the method adopted is to direct the patient to do his utmost to use the paralysed muscles, and to put them in action ; they are then gently stretched, and he is directed to resist as far as possible ; they are relaxed, and he is told to assist the movement as much as he can. At first no voluntary movement at all may be obtained, but gradually power is regained and the muscles slowly recover. The exercises are usually combined with massage and electrical treatment.

In lateral curvature of the spine, and many deformities of the limbs in which the trouble is due to weakness or paralysis of the muscles, carefully regulated exercise of the affected parts is followed by improvement, and occasionally complete cure. In the contracted and stiffened condition of joints often left by injuries and disease, passive and active exercises may restore mobility to the parts, loosen the adhesions, and strengthen the muscles which act upon them.

In Sluggish Livers.

Medical gymnastics are a great assistance to drug treatment in relieving the many troubles caused by sluggishness of the liver. The pressure under which bile is secreted is known to be very low, and insufficient to force it along its ducts into the intestine, and it is necessary for the bile to be squeezed out of the liver. This can be done by exercise, and the exercise must be active in character. In quiet walking along level ground very little pressure is brought to bear upon this organ, but in climbing a hill or running the case is different. The respiration then becomes more active, and the diaphragm descends forcibly in taking a deep breath, and presses downwards on the liver. During the exertion the muscles of the abdominal wall are set in action and press the liver upwards, so that it gets well squeezed between the two. Horse riding, rowing, and climbing hills are all suitable exercises for this purpose. And if these cannot be obtained similar movements carried out with the help of a Sandow's or Whiteley's exerciser can be substituted. An excellent exercise for this purpose consists in putting the arms over the head, then stooping forward with the arms extended, and trying to touch the toes without bending the knees. This exercise, carried out three or four times every morning after the daily bath, will cure many liver troubles. Acting by its stimulating effect on the liver, exercise will often relieve biliousness, piles, indigestion and constipation, with their many trying accompaniments, all of which may be traced to a stagnation of bile in the liver, and its presence in insufficient quantity in the intestines.

Nauheim Treatment.

Much also can be done to improve a weak or diseased heart by this form of treatment. It is well known that regular exercise followed by periods of rest has the power of developing muscles, and that by careful training the weakest muscles may be strengthened. Putting this into practice in the treatment of heart disease, it has been found possible by a carefully graduated course of exercises to develop the power of the heart muscles. The various gymnastic movements previously studied by Professor Ling were developed into a system for this purpose by the Doctors Schott of Nauheim; and combined with a course of baths and intervals of complete rest are much employed in the treatment of heart disease, under the name of the Nauheim or Schott treatment.

The baths are of two kinds, first simple saline, and afterwards saline effervescing, from the addition of carbonic acid. The exercises are resisted movements under the supervision of a skilled assistant, who carefully regulates the amount of resistance according to the patient's condition and strength. The amount of exertion is at first very small, but is gradually increased until the heart muscle is developed sufficiently to carry on its duties in the ordinary circumstances of daily life. Another system, known as Oertel's method, has been devised for the same purpose. In this the heart muscle is gradually developed by making the patient walk up an incline, which is day by day made steeper, until he is finally able to walk without difficulty or breathlessness up fairly steep slopes. During the course of these graduated exercises the patient is made to abstain as far as possible from liquids, and to take dry food.

Oertel's Method.

MASSAGE

Massage has been an acknowledged form of treatment for hundreds of years. It was praised by Hippocrates 500 years before the Christian era, and has been employed by Greeks, Romans, the Chinese and many Indian races. It consists of manipulations and passive movements of the parts by one who has trained for the purpose, but in a limited degree it can be carried out by anyone and is a useful adjunct to other forms of treatment. The manipulations consist in kneading, rubbing and tapping, and a few other refinements, and the general effect on the part treated and on the body generally is exactly that of active exercise. The kneading increases the flow of blood through the part, the rubbing drives the blood and waste products on into the blood and lymph vessels, and the tapping increases the circulation in the skin and neighbouring parts, the general result being accelerated circulation, increased removal of waste products, and improved nutrition.

This treatment is found useful in nervous exhaustion, and takes the place of exercise in the rest cure employed for that complaint; in excessive fatness or obesity, when exercise is impossible from the general muscular weakness and excessive weight; in heart disease, when the heart is too weak for muscular exertion; and in diabetes, to encourage the general nutritive changes.

Locally, massage is employed to stimulate the nutrition of paralysed muscles ; to alleviate the pain and swelling of rheumatism ; to relieve painful conditions produced by other causes such as neuralgia, lumbago, and sciatica ; and to remove pain, bruising and swelling, the result of strains, sprains and other injuries. Finally, it is of the very greatest value in many cases of obstinate habitual constipation, when it may displace, and be far more efficacious than, drug treatment. The rubbing and kneading in constipation are applied to the abdominal wall and through it to the bowels themselves ; it can be carried out by the patient himself, by a friend, or by a professional masseur or masseuse, and the movements should be always applied in the direction and along the course of the large intestine, that is in the direction of the hands of a clock.

The danger of employing professional masseurs and masseuses is that they are liable to be enthusiasts in their art, and look upon this treatment as a certain cure of all the ills that flesh is heir to ; and for this reason they occasionally carry it to excess and do harm. Within proper limitations the treatment is excellent, but it should not be resorted to in severe illness, in high fever or in acute inflammations, and it should be employed with great moderation if it causes a sensation of fatigue or exhaustion instead of having a soothing effect.

ELECTRICITY AND LIGHT

As a curative agent, electricity is used, in the form of either galvanism or faradism, mainly in cases of nervous disorder, and we have already said enough about it at the end of the section of this work which deals with such disorders. Here we may note that it is also used as a convenient means of applying heat ; by the electric cautery parts can be removed or unhealthy surfaces may be made to heal more rapidly.

High-frequency currents have been found useful in some forms of neuralgia, and in obstinate constipation. They improve conditions caused by bad circulation, relieve chilblains, and often cure some skin diseases, such as baldness and acne.

Electric light is now frequently employed in what is called the "light bath." The patient lies on a couch of open canework or glass, and all round him are placed a number of brilliant electric lamps. The bright light has somewhat the same stimulating and health-giving properties

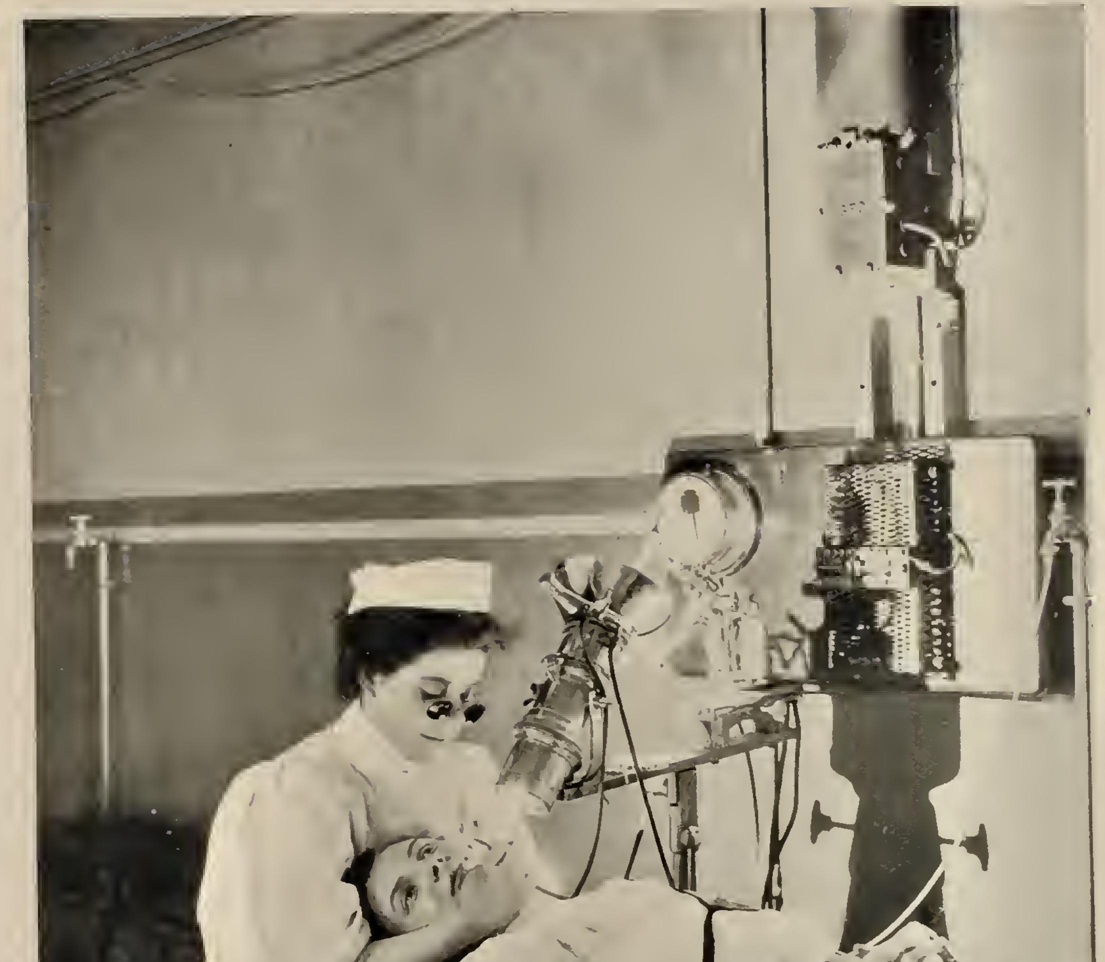


Photo: Pictorial Agency.

ADMINISTRATION OF THE FINSEN LIGHT AT THE LONDON HOSPITAL.

possessed by sunlight. Combined with this are the effects of heat, which correspond closely with those of a Turkish bath, a very profuse perspiration being produced. The light treatment is used in certain nervous complaints and painful conditions, such as neuritis, sciatica, lumbago, chronic rheumatism, and painful, swollen and stiffened joints.

Light Treatment.

The "blue light" treatment is also employed in similar complaints, and has a decidedly sedative effect, while the ordinary electric light is stimulating. It is carried out in a similar way to the ordinary light bath, the lamps being covered with blue glass.

The "red light" treatment has been recommended for small-pox, with the idea that it lessens the amount of scarring produced by the eruption.

Finsen Light.

Another form of light, called after Finsen of Copenhagen, has been much employed in the treatment of disease. Finsen discovered that sunlight from which many of the heat rays had been removed, and which was concentrated on a spot of skin affected with a highly intractable disease called lupus, had a curative effect. The Finsen light was introduced into this country largely through the interest shown in it by Queen Alexandra, who presented an apparatus in which electric light is utilised instead of sunlight to the London Hospital, and it is now extensively employed in practice for the treatment of lupus, and other skin complaints, with very successful results.

X-rays.

The X-rays are becoming more and more popular, not merely in diagnosis, but as a method of treatment, and great hopes are felt that they may ultimately prove most valuable. Already it is a common means of curing intractable cases of ringworm and many other diseases of the skin. Rodent ulcer and conditions caused by localised tubercular disease have been also cured by treatment with X-rays, and cases of quite superficial cancer have completely recovered under this method, but deep-seated cancers have so far withstood its effects, the rays being unable to penetrate to them. Much help, however, is obtained by combining the X-ray treatment with removal of the disease by operation.

Radium is now largely employed in the treatment of disease, but its action is so similar to that of the X-rays that it is not necessary to describe it separately. It is able to affect diseased tissues without destruction of the skin. It is particularly serviceable in rodent ulcer.

REST

Rest is one of the most valuable curative agents at our disposal. In a book by the great surgeon, Mr. Hilton, called "Rest and Pain," it is shown that the symptom of pain is direct evidence of the necessity for rest. An injured limb or broken bone, a painful stomach, a painful brain, a painful eye, should all be rested. And not only is this true of painful and injured parts, but in order to keep any organ in health it is necessary that rest and work should alternate. The human body was not made for uninterrupted work. Nature's arrangements show that this is a general law, for all the organs of the body carry out their duties with intervals of rest, and if the law be broken disease and perhaps death will follow. The whole body must be rested by a suitable amount of sleep every twenty-four hours, and even the regular night's sleep is not always enough for a hardworked brain. The fourth commandment is founded on this fact, and one day in every seven is by it ordered as a day of rest. The brain takes its rest only during sleep; the heart rests half the day and works the other half—or in other words it rests for half a second and works for half a second, all day long; the respiratory organs take seventeen short rests a minute; the stomach rests, in all but gluttons, for some time between each meal; and the general muscles rest and work in turns, one set carrying out some movements whilst the others are repairing the waste caused by work.

This principle must be understood and carried out in the treatment of disease. Nothing is so useful in the management of heart complaints as absolute rest in bed whilst the exercise required by other parts of the body is supplied by massage, and although we need not here enlarge upon this subject, the principle must be carried out in diseases of all the other organs. In fever also rest is of the utmost importance, for the body is being exhausted by the rapid nutritive changes produced by the raised temperature and increased by any exertion. In diseases of the eyes and ears what is termed physiological rest must be supplied, and they must be carefully protected from light and sounds.

THE WEIR-MITCHELL TREATMENT

This treatment, popularly called the "rest cure," is found useful in the treatment of nervous debility or neurasthenia, whether the result of illness or of the "wear and tear" of life. This complaint for which it

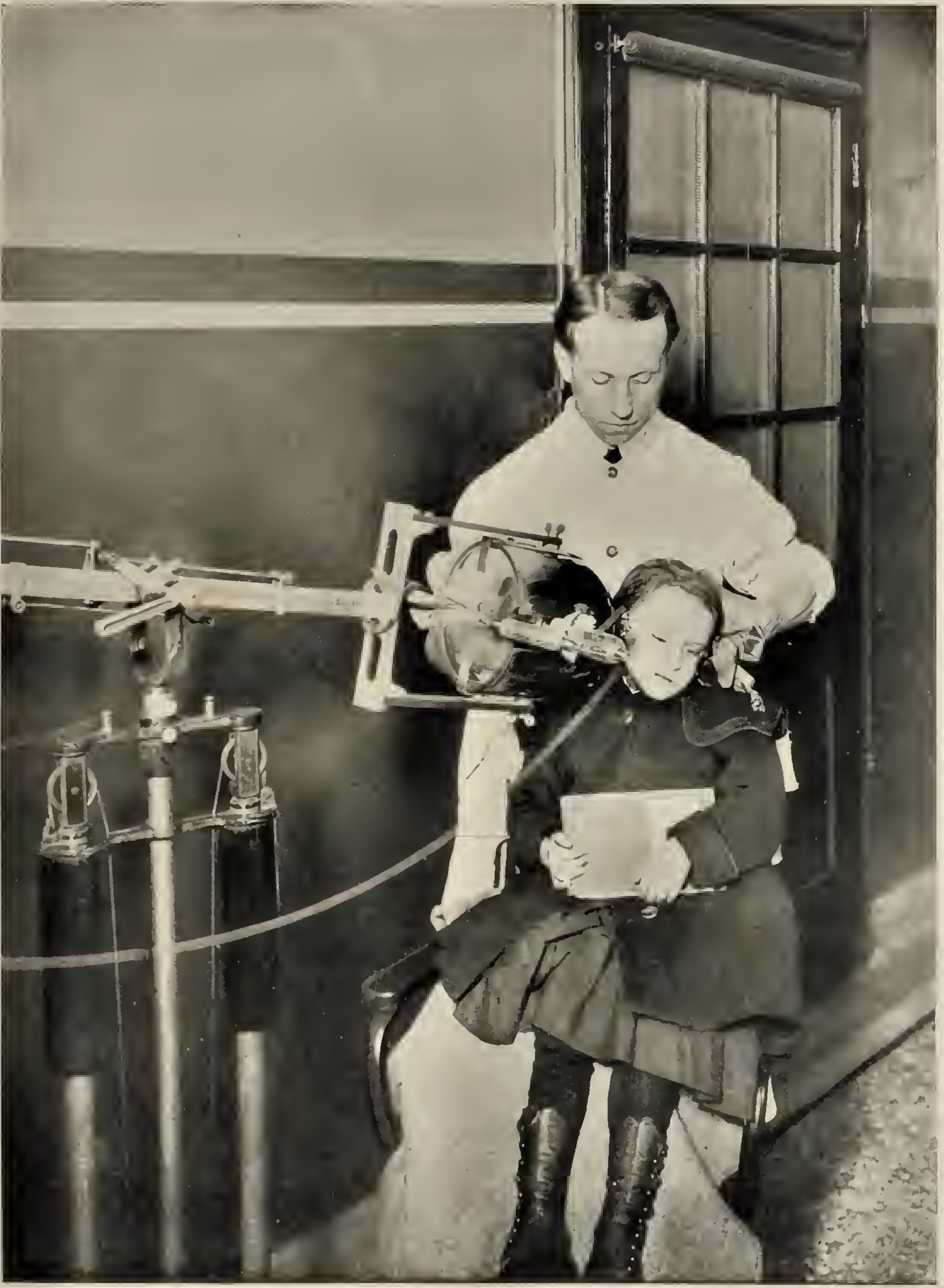


Photo: Pictorial Agency.

ADMINISTRATION OF THE X-RAYS AT THE LONDON HOSPITAL.

is difficult to find a better name than "wear and tear," is becoming more and more common as life becomes more strenuous and more exhausting. It is not the strain of physical labour that produces it, for the fatigue induced by the hardest bodily toil may be dissipated by "tired Nature's sweet restorer, balmy sleep," but the over-exertion of the mental faculties, the anxiety and worry of the struggle for existence, and the ambition to make money and rise in the world. The increase in the standard of education tends to make all wish to rise in the social scale, and this ambition involves long hours of work with constant worry and nerve strain. No wonder, therefore, that many break down in the struggle and become the victims of neurasthenia and nerve exhaustion. Yet "wear and tear" is not the lot of those only who are working for their living or for ambition; it is met with quite as often amongst what are erroneously called the leisured classes, whose constant labour is the pursuit of pleasure, who turn night into day, who rise when the sun is high in the heavens, and retire jaded to bed just as daylight breaks. The overworked men and women of Society are frequent victims of nervous exhaustion, and many of them are fit for nothing at the end of a London season but to go to bed and take a "rest cure."

This treatment, named after an American doctor, consists in putting the patient to bed, in the charge of nurses, and entirely isolating him from the world and all its interests; no visitors are to be seen and no letters to be read, and the smallest exertion, mental or physical, is forbidden. Food is given at regular, short intervals of two or three hours, and the want of exercise is supplied by a careful course of massage, which keeps the muscular system in tone, encourages the circulation, increases the appetite, produces improved sleep and counteracts constipation.

CHANGE OF AIR

But there is another treatment for "wear and tear" which is almost as rapid in its results as the "rest cure," and that is change of air and scene, a complete variation from ordinary occupations and pursuits. But unfortunately it is just those persons who require a change who find it so difficult to take it—those who occupy positions of importance to the community at large, or who are the breadwinners of the family. The change may be merely a week at Margate or a tour among the Alps, but it must be such that for the time the mind is rested and enjoys freedom from the strain, worries, and anxieties of the ordinary daily round. This remedy is of great value in the treatment of many other conditions—in the early stages of certain chronic diseases such as consumption and kidney trouble, in the mental states which are precursors of intellectual collapse, in gout, rheumatism, severe anæmia, many forms of indigestion, chronic inflammations, long continued skin diseases, and in convalescence from almost all forms of severe acute diseases.

CLIMATE

Where should we go for a change? is a question which has often to be answered. What climate is suitable for this or that particular complaint?

Let us briefly review the varieties of climate and try to indicate the particular conditions for which they can be specially advised.

Change of Climate.

We have explained in the chapter on the causes of disease that climates produce certain diseases, and it is generally advisable for persons so affected to take a change. The diseases of the liver, intestines and brain brought on by warm climates are benefited by a visit to colder places, while the diseases of the respiratory organs resulting from cold and damp are often cured by residence in a warm, equable climate. Although the winter months are trying to most who live in England, there can be little doubt that much benefit is derived from their bracing and invigorating effects, and that an equable climate is hardly to be recommended for the strong and healthy. But warm, dry climates with very moderate variations of temperature and humidity are of the greatest value in the treatment of chronic disease of the kidney (Bright's disease), and relieve that organ by their power of increasing the action of the skin; they are also of value in those cases of chronic bronchitis in which there is much expectoration.

Sea Air.

Sea air is stimulating and invigorating, and is useful in convalescence from most diseases. Its purity makes it suitable for the consumptive; the iodine and ozone it contains are beneficial in all scrofulous and tubercular conditions, and it is often strongly to be recommended for those who are affected by chronic diseases of the respiratory and circulatory organs.

Sea voyages combine rest of mind and body with life in the open air; in cases of nervous exhaustion they are almost as good as the rest cure. The disadvantages are that storms and bad weather are liable to occur, and necessitate confinement in close cabins, which with the unpleasant experience of sea-sickness, may produce serious symptoms, especially in early cases of consumption. There is also less variety of food, and possibly bad cooking. However, on the whole, sea-voyages can be recommended for early cases of consumption, for catarrh of the respiratory organs, for asthma, especially if combined with chronic bronchitis, and for hay fever. For those who are very bad sailors, those who have advanced disease, those who have blood spitting, great exhaustion or constant fever, sea voyages are unsuitable.

Voyages.

Wooded districts, being moist, equable and sheltered, are to be recommended for chronic diseases of the heart and lungs, and for those cases of bronchial trouble in which there is not free expectoration. Pine woods are of special value from the antiseptic properties of the resins they produce.

Forest Air.

Mountain climates at high altitudes are suitable for early consumption, for the overworked, for those convalescent from acute disease and for all who are able to take plenty of active exercise. They are unsuitable where there is organic disease of the heart, chronic bronchitis, chronic rheumatism and consumption, with fever or blood spitting.

Mountain Air.

Many health resorts also have special treatments. For example, Meran in Austria, besides the treatment by climate, possesses special baths—steam, electric, mineral, balsamic, douche, and ordinary; electric massage, and the milk, Koumiss, Kefir, whey, grape and fruit cures.

Special Cures.

Cures of this last group are practically water cures, for the foods used all contain large percentages of water, which washes out waste material from the body and necessitates a much diminished food supply.

Special forms of treatment are also carried out at many other health resorts; mud baths, for example, at Franzensbad, and sun baths at Veldes in Austria.

HYPNOTISM

The first idea of persons who know nothing about this subject is that it is all humbug, but in this they are greatly mistaken. In the public performances of mesmerism and hypnotism there may be much nonsense introduced to make a good show, but that hypnotism is any longer to be regarded as trickery, or even as a mystery or a superhuman power, no one who has studied the subject would allow.

History.

From time immemorial among the Egyptians and Hindoos a similar condition has been produced by conjurors or sorcerers. The monks of the celebrated monastery of Mount Athos were accustomed to throw themselves into a state of trance or ecstasy in which they imagined themselves transported to heaven, by staring fixedly at some small object, a method still commonly employed to produce the hypnotic state. In 1772 Mesmer, a physician of Vienna, practised the treatment of disease by what was called animal magnetism or mesmerism, producing in his patients by the use of magnets peculiar nervous conditions which are similar to those of hypnotism. The whole subject fell into great disrepute, and was for years avoided by the medical profession. However, in 1841, James Braid, a Manchester surgeon, having had his attention drawn to the subject at a mesmeric *séance*, studied it scientifically, and proved that the phenomena of mesmerism were dependent upon a peculiar state of the nervous system, closely allied to sleep, and he proposed the name of "hypnotism," which is Greek for sleep. It is only quite recently that the condition has been employed in the treatment of disease, but it is now very extensively used on the Continent, and is slowly finding its way into practice in this country.

Methods.

The methods employed to induce the hypnotic condition vary according to the operator's fancy, but they are all carried out upon the same principle. The mind of the patient is concentrated upon some particular object or subject. For instance, he stares fixedly at and thinks about a small bright disc or coin, and it is well that he should do this in such a position that his eyes are somewhat strained. When he is thus wearied and his thoughts are concentrated he is bidden to go to sleep, and the direction or suggestion, as it is called, is accompanied with suggestive movements of stroking or passes with the hand. If he is amenable to hypnotic influence he falls asleep, and when in the hypnotic state is unconscious of all around him except his hypnotiser, whose directions he at once obeys. Persons have frequently had serious operations performed on them whilst in this condition, without feeling the slightest pain, and suggestions made under its influence have been found useful in the treatment of certain diseases.

We all believe in the influence of the mind over the body. An incident which exemplifies it is related of a man on whom his friends decided to play a practical joke. Every one of them in turn remarked to him how ill he looked, and after this "suggestion" had been made several times he went home and became quite ill. Now in the hypnotic state the influence of suggestion is far more powerful and lasting than in the normal state. The present writer knows of a man who, while in the hypnotic condition, had an ordinary pen placed in his hand with the suggestion that it was hot. After violent efforts on his part to throw away the pen he was awakened, and on his hand being examined, there was a bright red line caused by the pen! By means of suggestions conveyed in words, actions and surroundings, many diseases may be relieved, neuralgic and rheumatic pains may be removed; headaches may often be cured, and so may the various manifestations of hysteria, hypochondriasis, and other nervous complaints.

An interesting example of the value of hypnotism is that of a young man, heir to a title, who was drinking himself to death and disgracing the name he bore. He was hypnotised and the suggestion put to him, "You will hate not only the taste of alcohol, but even its smell." The operator heard nothing more until many months afterwards, when he met the patient's father and learned that he had entirely given up the use of intoxicants from the day that he was hypnotised, and that the smell of alcohol was so offensive to him that he could not lunch in a restaurant.

But drunkenness is not always cured so easily as this, for in Russia, where this treatment has been tried in many hundreds of cases, the best results reported are those of the Moscow Institution, where only 20 per cent. of the cases were cured.

Great benefit results in many cases in which sleeplessness is a symptom by the production of sleep by this means, and the writer has been able to do this for a patient suffering from an apoplectic stroke with insomnia; a few passes of the hand and the suggestion of sleep were all that was necessary to produce a thoroughly restful night.

Hypnotism cannot cure *organic* disease, although it relieves many of its most troublesome symptoms, such as severe pain. Unfortunately it fails also to cure many *functional* diseases, for which it seems just the proper treatment. The chief reason why it fails is because only a certain proportion of persons can be brought under its influence. It has been found that about 80 per cent. of the community can be hypnotised. The popular idea that anyone may be hypnotised against his will by a few passes or a commanding look is as absurd as the ordinary notion that a chloroformed handkerchief waved before the face produces unconsciousness. The subject must be a willing agent, and must obey implicitly the orders given. Sometimes, however, persons who are overcome by fear and have really, though unintentionally, given themselves into the power of the operator can be hypnotised, and the oftener they pass through the process the easier it is to produce the condition again.

Evil as well as good suggestions can be instilled hypnotically, and in this lies the danger of hypnotism. For instance, by what is called post-hypnotic suggestion, an act suggested during unconsciousness may be carried out at a future date, the individual acting at the time as an automaton without knowing why he does it, or perhaps explaining his conduct by some erroneous argument. The operator might say, " You must write out a cheque for a hundred pounds and send it to me," or " You must attack someone with a knife," and the act would be carried out. Hypnotism is, for this reason, regarded as a somewhat uncanny affair, and most doctors therefore fight shy of it. It is, however, a valuable means of treatment in suitable cases, and if carried out by medical men of repute who have made a study of the subject, can lead to no harm.

HOMŒOPATHY

In 1796 an essay was written by Samuel Hahnemann on " Suggestions for Ascertaining the Curative Power of Drugs," which embodied proposals that had previously been made by older writers, such as Hippocrates and Van Störrek (in 1762), that diseases should be treated by drugs capable of producing similar symptoms. This mode of treatment has been named homœopathy, and its motto is *similia similibus curantur*—like cures like. It also teaches that the drugs must be administered in doses smaller than those that would produce the symptoms. But unfortunately for this theory it has been proved that drugs produce different symptoms according to the dosage ; that, for instance, a small dose of atropine will slow the pulse but a large dose will quicken it, so that if we give a small dose of atropine for quick pulse we are giving it for a symptom the reverse of what it will produce in larger doses, and that, therefore, the opposite principle is more true, namely *contraria contrariis curantur*—disorders are cured by their opposites.

Hahnemann recommended that drugs should be given in minute doses, and writing in 1806 he speaks of giving hundredths, thousandths, and even millionths of the ordinary allopathic doses, until he reduced the matter to what many considered a mere absurdity. Dr. Dudgeon, a great writer on homœopathy, in describing the symptoms produced by aconite, filled endless pages with all the symptoms under the sun, and would thus lead us to consider aconite a panacea for all ills, and a cure for conditions diametrically opposite in their nature and causes.

The ordinary method of treatment or *antipathy*, usually called *allopathy*, considers that drugs should be given to counteract symptoms the opposite of those which they produce. Drugs, according to this theory, take a position somewhat similar to antidotes for poisons. This would certainly seem to be Nature's method, as everyone must have discovered for himself. The way to relieve fatigue is not to make some further exertion.

FAITH CURE

We have already mentioned the wonderful power of the mind over the body and the effects of suggestion, and the many apparently miraculous cures brought about by faith-healing are to be explained in much the same way. The power of will is lost, and an individual becomes firmly convinced that he cannot do some particular thing, and to all intents and purposes he cannot until the requisite stimulus comes and the will again becomes active.

Power of Faith.

The following incident shows the power of faith. A lady who had lain in bed for a year and been unable to walk a step was taken to a famous bone-setter, who said her back was "out" and he could cure her. She was ordered to rub her back night and morning with oil, and come back to him in a week for the critical operation. She went away, rubbed in the oil assiduously, and thought of nothing but the operation that was to cure her. She was carried to the bone-setter's consulting-room, he did something to her back, and she got up and walked there and then. The case obviously was one of hysteria, and her faith in the bone-setter enabled her to overcome the condition. Similar instances are met with constantly, and during the month of August of each year many cases of the kind occur at Lourdes. Here, on February 11th, 1858, the Blessed Virgin is said to have appeared to a poor girl called Bernadette Soubirous, and a spring which arose from the spot is believed to be endowed with miraculous powers; and all round the grotto are crutches and sticks that have been thrown away by patients who have been cured. The place and story are such as would exercise great influence on the minds of believers, and would in this way produce faith cures. At least this is the explanation given by those who do not believe that miracles now happen.

The Peculiar People.

A sect of faith-healers called the Peculiar People was founded in London in 1838, who refuse to call in medical aid when sick, relying on anointing with oil by their elders, and unceasing prayer. As long as the disease affects themselves they are at liberty to put their beliefs into practice, but if their children become ill and die without medical attendance they render themselves liable to the law, and have frequently been prosecuted for manslaughter. The members of this deluded sect are chiefly poor working people.

Christian Science.

Christian Science is another system of faith-healing. The cult was originated by a Mrs. Eddy, in America, and has obtained many adherents there, and not a few in this country, mainly among the wealthier classes. They hold the view that the soul can control the body, and that disease is essentially imaginary, and can be banished by a strong and pure will. Not accepting the fact of disease, they do not believe in medicine, nor do they seek medical advice. If they fall ill they send for some healer or Christian Science practitioner, who for so much a week will pray for them until they are healed.

The name of this body seems inappropriate, for it is difficult to discover in the system anything that can fairly be called either Christian or scientific. Certainly, to judge by the book written by the founder, the chief doctrines of Christianity are conspicuous by their absence, while of science there is a plentiful lack. A large number of cures have been effected by this method of treating disease, just as is the case with all faith-healing systems, but many avoidable deaths have also occurred, of which a few have become public owing to the inquests which have had to be held in cases where no certificate of death was forthcoming.

BONE-SETTERS

Bone-setters are a class of irregular practitioners who sometimes attain popular reputation for the treatment of injuries to the limbs and joints. They are often uneducated men and unqualified to practise medicine and surgery, but some of them undoubtedly possess manipulative skill, and cure cases where regular practitioners have failed. In some cases the business has been in the same family for several generations, and the manipulative measures practised have been handed down from father to son. Such operators usually treat their cases with violent wrenching movements, using a force which a regular practitioner would fear to employ on account of the dangerous consequences that might ensue. The method they usually pursue is to diagnose everything, whether affection of joint or muscle, as "something put out"; they order rubbing with oil and fomentation with hot water to loosen the parts, and then by violent and forcible movement put the "something" in again. Being ignorant of anatomy and of disease, they occasionally do much harm by this treatment, but on the other hand they sometimes cure cases that have been under gentler and more orthodox treatment for months without relief. Their failures probably far outnumber their successes, but one success brings more renown than a hundred failures bring disgrace. The patients who are cured never cease to boast of their wisdom in acting contrary to authorised advice, but those who are damaged are ashamed of themselves and hold their tongues. The fact that bone-setters sometimes "score" off qualified men is well recognised by the medical profession, and it is now becoming the custom in cases of injuries to joints and other parts, in which stiffness and loss of usefulness have continued for a long time, to put the patient under an anæsthetic and by movements and some force, controlled by anatomical knowledge, replace a dislocated muscle or tendon, or break down any bands or adhesions that have been left by inflammation.

CHAPTER XXXIX

DRUGS AND PRESCRIPTIONS

Weights and Measures—Tablets and Tabloids—Capsules—Cachets—Pills—Powders—Suppositories—Glycerine Injections—Enemata—Hypodermic Injections—Fomentations—Compresses—Poultices—Counter-irritation—Blisters—Plasters—Ointments—Liniments—Prescriptions, etc.

Drugs vary much in strength, and are diluted in mixtures according to the doctor's directions, and the doses of medicines vary from drops to bottlefuls. The following are the weights and measures with which all should be acquainted:—

Apothecaries' Weight

20 grains = 1 scruple.
3 scruples (60 grains) = 1 drachm.
8 drachms = 1 ounce.
12 ounces = 1 pound.

Fluid Measure

60 minims = 1 fluid drachm.
8 fluid drachms = 1 fluid ounce.
5 fluid ounces = 1 gill.
20 fluid ounces = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon.

These quantities are considered to correspond to the following popular measures:—

1 minim = 1 drop.
60 minims = 1 drachm = 1 teaspoonful.
120 minims = 2 drachms = 1 dessertspoonful.
4 drachms = ½ ounce = 1 tablespoonful.
8 drachms = 1 ounce = 2 tablespoonfuls.
2½ ounces = 1 wineglassful.
20 ounces = 1 pint = 2 tumblerfuls.

But it is always wisest to measure medicines ordered in drops in a minim measure glass, and other doses in an ordinary medicine glass marked with ounces and spoonfuls, for the measures ordered really differ much from the popular measures, and the latter also vary very much from one another.

A drop varies in size according to the thickness of the fluid, and spoons are most uncertain in their capacity. Very often mixtures and draughts are ordered in divisions of the bottle : an eighth part, a sixth part, or half the draught is prescribed, and there is no need for further measurement.

Tablets and Tabloids.

Tablets and tabloids form one of the great improvements in the preparation of drugs. They are easily swallowed ; they contain definite doses of both solid and liquid drugs (the latter corresponding in dosage to ordinary tinctures) ; they occupy little space ; and they do not lose their efficacy even when kept for long periods, whatever the climate. They are especially useful to stock medicine chests for those going abroad, who wish to take as small an amount of luggage as possible, and who are not well informed as to the dosage of drugs.

A list of useful tabloids and the doses of active drugs they contain is given later in this chapter.

Capsules.

Capsules are little cases made of gelatin and used for dispensing nauseating drugs, especially offensive and strong-tasting oils. They are swallowed like pills with a draught of water, and are rapidly dissolved in the stomach, their contents being then set free.

Cachets.

Cachets are cases of wafer paper, and are made of various sizes, according to the dose they are required to contain. They may be employed for any drugs, especially powders and those that have an unpleasant taste. They should be dipped in water, and then swallowed like pills.

Pills.

When giving medicine in pills it is as important to do so at the proper time as with fluid medicines. An aperient pill is almost always ordered at bedtime or in the evening, as it requires many hours in which to produce its result. The difficulty some people experience in swallowing a pill is purely nervous, and certainly not due to the smallness of their throats, for every mouthful swallowed at meals is many times the size of the largest pill.

The pill should be taken without any great muscular effort; it should be placed in the mouth and then swallowed with a good mouthful of water, and it is not necessary to throw the head far back.

Powders.

Powders are certainly far less agreeable to take than pills, but they may be given to children whose powers hardly extend to pill swallowing, and to adults whose powers are equally deficient. This form of medicine is useful also in excessive vomiting, when all others may be rejected at once from the stomach, or in unconscious patients, when it is one of the easiest ways of giving a dose. Small powders should be placed on the handle of a spoon, a narrow paper-knife or spatula, and dropped far back on the tongue, and then washed down with some pleasant drink. In children, whose annoying habit it sometimes is to spit out their medicines, this method is efficacious, for it is difficult to spit out a powder if placed sufficiently well back in the throat. Powders may also be mixed in and concealed by jam, marmalade, or treacle; but the custom is not likely to make these delicacies rise in the patient's estimation.

Liquorice powder is a useful aperient, but the usual method of taking it, stirred up with water like weak gruel, does not make exactly a tasty drink.

Small doses of drugs, especially calomel, a first-rate aperient for children, can be made quite pleasant to take if mixed with a few grains of powdered white sugar.

Suppositories.

Sometimes it is expedient to introduce drugs into the body by the bowel rather than by the mouth, and one means of doing this is by the use of suppositories. They are little cone-shaped pieces of wax into which the drugs are well mixed. They melt at the temperature of the body, and set free the drug in the bowel. To introduce a suppository, it should be greased with a little vaseline and pushed into the bowel as far as the finger can reach, and well above the ring of muscle which controls the orifice of the bowel.

The drugs used in suppositories act in one of two ways—either locally on the bowel or generally on the body after absorption. The local action desired may be astringent to check hæmorrhage or mucous discharge, when we use tannic acid, hazeline, or compound lead suppositories. Or a sedative action may be desired, and morphine is employed, suppositories containing $\frac{1}{2}$ grain or any other quantity ordered by the doctor being prepared by the chemist.

Thirdly, a suppository may be used for its aperient effect, and the drug then chosen is glycerine. Each suppository contains from ½ to 2 drachms of glycerine according to the size ordered.

A home-made suppository which is useful in the constipation of infants and young children can be formed of a piece of ordinary yellow soap of the shape and size of a small thimble, but solid, of course.

Nutrient suppositories are described in a later chapter.

Glycerine Injections.

Glycerine injections are used to produce an action of the bowels similarly to a glycerine suppository. The syringes employed for this purpose are made of a special shape with a long curved vulcanite nozzle, and contain from 2 drachms to a tablespoonful. It is quite easy for a patient to administer such an injection to himself, or an amateur nurse may be called upon to do so in cases of emergency, for one advantage of this form of treatment is its rapid action.

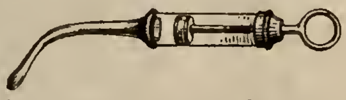


Fig. 58.—GLYCERINE SYRINGE.

Enemata.

Injections into the bowel used to be called clysters. They are most commonly employed for the relief of constipation, and some people use injections of either tepid or cold water habitually for this purpose. Soapsuds and water form the best aperient injection, and the more soap that is used the more active is the effect, about 2 ounces to the pint of water being the ordinary amount; it is usually necessary to introduce from 1 to 1½ pints in an adult, and about ¼ pint in a young child.

To administer an enema the patient should lie on the left side, with his back toward the nurse, and his buttocks projecting over the edge of the bed. The head should be kept low by removing the pillow, and should be placed towards the middle of the bed, and the pillow, folded in half, should be put under the hips and covered with a mackintosh sheet. The injection may be given either with a Higginson's syringe or with an ordinary douche can. The latter is perhaps the more easy if the individual administers the injection himself, but we will proceed to describe the method with the syringe. The nozzle, which should not be more than 3 inches long, should be well greased and introduced into the bowel with great gentleness, and its direction should be towards the left side, and not in the middle line. No force should then be employed, but by gently squeezing and relaxing the ball of the syringe a sufficient quantity of the soap and water should be introduced, taking care at the same time that the end of the suction tube is kept under the water in the basin from which it is being drawn, or air will be injected, a thing to be avoided. The injection should be given very slowly, or the bowel will contract and reject it, and if the water begins to escape before enough has been administered it may be retained by pressing the buttocks together round the tube. Sufficient fluid having been injected, the tube should be slowly withdrawn and the patient directed to remain quite still for a time and retain the fluid as long as possible.

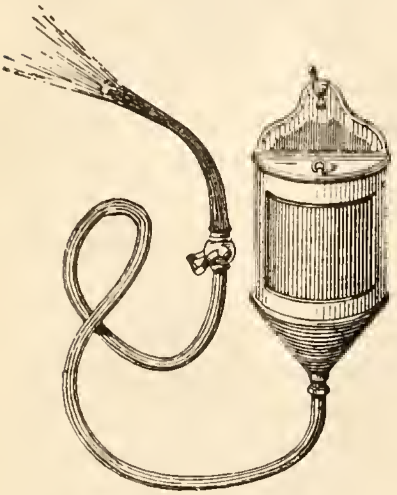


Fig. 59.—Douche Can.

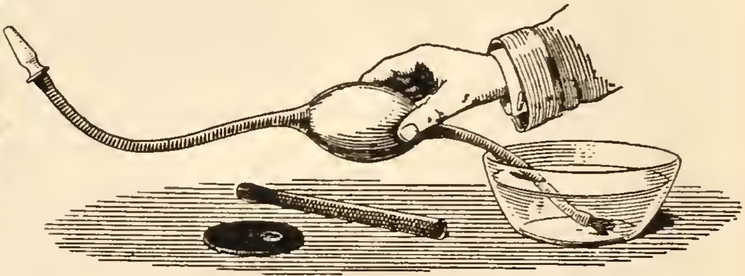


Fig. 60.—Higginson's Syringe.

Other aperient injections are olive oil, either alone or with warm water, or 3 or 4 ounces of oil followed in three or four hours by soap and water; castor oil instead of olive oil; and Epsom salts. The latter forms the very efficacious *sulphate of magnesia enema*, and is prepared as follows: 1 ounce of Epsom salts and 1 ounce of olive oil are added to 15 ounces of water which has had 3 drachms of starch boiled in it.

Enemata are sometimes used for the removal of threadworms, salt and water or infusion of quassia being employed, and ½ pint being the amount required for a child.

For the relief of flatulence a *turpentine enema* is useful; it consists of 3 drachms of starch well mixed with 15 ounces of water and boiled, and then 1 ounce of oil (or spirits) of turpentine added to it. It should be injected with a long tube.

To stop diarrhœa or relieve pain in or near the bowel, the sedative *starch and opium enema* is used; half a teaspoonful of starch or arrowroot is mixed and boiled with 2 ounces of water, and (for an adult) 30 drops of laudanum are added. This amount, after it is cold, is injected very slowly, an indiarubber ball syringe being employed for the purpose (Fig. 61).

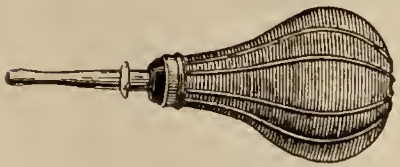


Fig. 61.—Indiarubber Ball Syringe.

In cases of great collapse from injury, operation, or severe loss of blood, much benefit is obtained by *injections of normal salt solution*, which consists of a teaspoonful of table salt to a pint of warm water, and 1 or 2 pints of this may be given and repeated if necessary. The fluid is very rapidly taken up into the body, and seems almost to take the place of the blood that has been lost. A Higginson's syringe or a douche can should be used.

Nutrient enemata should consist of peptonised food, either beef-tea or milk, according to directions given elsewhere; and each injection should consist of 4 ounces or less, as a larger amount will cause its rejection. Three or four teaspoonfuls of brandy may be added to each, but this is more irritating to the bowel than the beef-tea or milk; and an egg may be beaten up in and injected with the other food. It is advisable to strain the beef-tea, after peptonising it, through fine muslin, and to remove any solid particles of meat, which cannot be absorbed and may possibly cause irritation.

All nutrient enemata should be at blood-heat and must be injected very slowly, and an indiarubber ball syringe should be used, whilst great care must be taken to avoid irritating or injuring the bowel with the nozzle.

Hypodermic Injections.

Another way of administering drugs is by injection under the skin, but this should not be undertaken by an amateur nurse except under the direction of the doctor. The hypodermic syringe is a small glass syringe constructed to hold only a few drops of liquid, and so arranged that a hollow needle can be fitted on to it, through which the drug is injected. Only very strong medicines are given in this way, and in a concentrated form, so that it is very important to be exact as to the number of drops which make the proper dose. Absolute cleanliness is necessary, and it is the usual custom to boil both needle and syringe before use. The drug is ordered in drops or in the form of a tabloid; if the latter, it is dissolved in a few

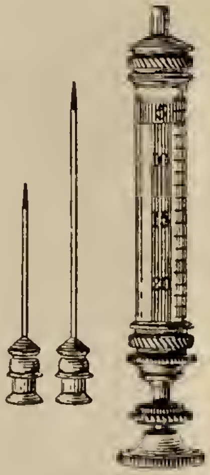


Fig 62.—Hypodermic Syringe.

drops (5 to 10) of water in a wineglass and drawn into the syringe; if the former, the requisite number of drops only should be retained in the syringe, and the proper number can be easily measured with accuracy, as the graduations are plainly marked either on the barrel or on the piston. Fill the syringe with the solution, turn the point upwards, and press the piston slightly so as to expel any air that may be in it, and all fluid, until only the requisite number of drops remain.

Give the spot where the injection is to be made a good rub with some spirit and water, and then pinch up a fold of skin between the finger and thumb of the left hand and push the needle through the skin with a sharp thrust, holding only the barrel of the syringe and avoiding pressure on the piston.

Now slowly press down the piston, driving out the liquid until the syringe is quite empty. Next gently withdraw the needle whilst the pad of the left forefinger is kept pressed over the puncture to prevent the escape of the injected fluid.

The particular spot at which the injection is given is not of much importance; but, as a rule, the back of the arm is chosen, as it is not a sensitive part, and is fairly free from superficial veins.

After using the syringe, carefully wash it and replace the wire through the needle.

For hypodermic injections of serums a special syringe must be employed (*see* end of chapter).

Fomentations.

Fomentations are used to apply moist heat, and consist of flannels, cloths, or sponges wrung out of hot water. The articles required are a basin, a flannel, a large towel, a piece of waterproof, a large sheet of cotton-wool and boiling water. Place the towel across the basin with the flannel laid in its centre, pour the boiling water over the flannel until it is thoroughly wet, then take the ends of the towel in the two hands and twist them in opposite directions until the flannel is wrung dry; take the flannel out, unfold it, give it a good shake, and apply quickly, covering it with mackintosh, cotton-wool and a bandage.

A good *wringer* is made with 1½ yards of strong coarse calico or crash, 18 inches wide, doubled and stitched like a small roller towel, and two pieces of stick rather more than 18 inches long. The latter are passed through the ends of the wringer and used as handles to squeeze the flannel dry.

Spongiopiline is a suitable material for fomentations; it is soft and absorbent, and has one surface impervious to water. It is better, however, to cover it with mackintosh, as the heat is thus retained longer.

Fomentations are lighter and more quickly prepared than poultices, but lose their heat more rapidly and require changing every twenty minutes. They must be applied moist, but not wet, or they will scald the patient.

A *turpentine stupe* is a fomentation upon which 30 or 40 drops of spirits of turpentine have been sprinkled. It is used for colic, flatulence, or sluggish liver.

Laudanum or *tincture of belladonna* is often sprinkled on fomentations for the pain-relieving properties which these drugs possess.

A *poppy fomentation* is made by boiling for ten minutes ½ pound of crushed poppy heads, from which the seeds have been removed, in 4 pints of water. With the strained fluid a flannel is moistened.

Compresses.

Compresses may be used cold, warm, or hot, and consist of lint, spongiopiline, or folded-up linen wetted with water and covered with oil-silk. They may be applied to all parts of the body, and are especially useful in sore throat. A doubled piece of lint or an old handkerchief is folded to the desired size, dipped in water and applied under a piece of oil-silk, which should slightly overlap it in every direction. The compress is kept in place with a bandage or folded handkerchief.

The *boracic compress* is now often used instead of poultices to relieve inflammation and soothe and clean offensive and inflamed wounds. For the latter purpose it is much more suitable than linseed poultices, as it is antiseptic, whilst the linseed often contains much dirt and germs. A boracic poultice or compress is made by wringing out a doubled piece of boracic lint in hot water, or a plain piece of lint in boracic lotion; it is applied hot, and covered with oil-silk and cotton-wool, and fixed with a bandage.

Poultices.

A badly and carelessly made poultice is the most disagreeable thing a patient can have to endure in the way of treatment, but one properly made may afford him the greatest relief and comfort. There are, of course, many different kinds of poultices; in the following paragraphs we shall describe how those most commonly used are made.

A *linseed poultice* is made of crushed linseed, and not the linseed meal of commerce, which is merely ground oil cake with all the oil extracted. If the latter kind of linseed is used, sweet oil must be smeared quickly over the surface of the poultice after it is made to prevent it from sticking to the skin.

Before starting to make a poultice, have everything you will require ready at hand—linseed meal, a small basin, a large spoon, a flat paper-knife, a piece of unbleached calico or some tow, sweet oil if necessary, and a kettle of boiling water. Next place the meal before the fire, and heat the basin, spoon and paper-knife with the boiling water. Now pour some boiling water into the basin (½ pint of water is required for every 4 ounces of meal, and ⅓ pint makes a fairly large poultice), and gradually sprinkle in the meal with the left hand while it is being well stirred with the spoon in the right until it reaches the proper consistency, is well mixed, and free from lumps. Then turn it out on the calico or tow laid ready to hand, and spread it evenly over this with the paper-knife.

The poultice should vary in thickness according to its purpose. For medical poultices about ½ inch would be the right thickness, but for surgical purposes it must be much thinner. It should cover the calico or tow all but ½ inch all round; this edge should then be turned up over the linseed.

The poultice is now ready for use. It should be folded up, placed on the palm of the hand or a hot plate, and applied without delay, the patient having been previously prepared. One edge of the poultice should first be placed against the part and the rest applied as soon as it can be borne. It is best to let the meal come in contact with the skin, but if the skin is delicate or the patient a child, the surface may be smeared lightly with vaseline or covered with muslin. The paper-knife may be replaced with a large table-knife or spatula, and, instead of calico, cotton-wool, linen, rags, old flannel or a piece of blanket may be used.

A poultice bag will be found very convenient. One side of it is made of muslin, which is placed next the skin, the other of mackintosh, which protects the clothing and retains the heat; and between the two is placed the linseed meal. The poultice should be kept in position by a broad flannel band or some warm material.

Linseed poultices are applied to inflamed parts. They relieve the inflammation, and if matter is forming bring it more rapidly to a head; they also lessen pain, and are always a safe form of treatment in cases where there is severe pain without any wound. They are used also in inflammations of internal organs, and in attacks of colic, pleurisy and inflammation of the lungs. By drawing the blood to the surface they act as counter-irritants.

The *objections to poultices* are that they are heavy, and that their weight hurts sensitive parts, and oppresses the breathing when they are placed on the chest. They are liable to become dry, hard, and cold, and are then uncomfortable, and even injurious. They are dirty, and crumble into the bed if badly made, and occasionally they irritate the skin and produce spots and small boils. Lastly, they are not antiseptic, and should therefore only be applied to wounds that are unhealthy and offensive or to unbroken skin. For wounds a boracic compress (p. 313) is far more suitable.

Poultices should be changed directly they get cold. A good plan is to keep a poultice on for two hours and then remove it and cover up the part with cotton-wool or flannel for two hours, when another may be applied.

To *remove a linseed poultice*, begin at one edge, turning it in and rolling it up, pressing gently on the skin so as to avoid leaving any of the meal sticking to it. If well made the whole poultice should come away in one piece.

A *jacket poultice* is sometimes required in diseases of the chest; it should be made on a piece of linen sufficiently large to reach round the chest, and tapes should be sewn on so as to fix it at the side and over the shoulders.

A *mustard and linseed poultice* can be made of any strength that seems desirable. A fairly strong one is prepared by putting two tablespoonfuls of mustard into the basin and mixing it smoothly with boiling water poured in gradually; the linseed is then added, as in making a linseed poultice. It is a good counter-irritant, and is useful in acute bronchitis or in the painful muscular affections of chronic rheumatism. It should be left on sufficiently long to cause redness, but not blistering, and the length of time must be left a good deal to the patient's feelings.

Mustard poultices, made of mustard and water only, cannot be well borne for more than ten minutes. A far better and cleaner application is a *mustard leaf*, which is dipped into warm water and kept applied to the skin by gentle pressure for from ten to twenty minutes.

A *bread poultice* is made of coarsely crumbled bread instead of linseed. The basin containing the poultice should be placed before the fire or over a saucepan of boiling water to allow it to swell, and the superfluous water having been drained off, it is ready for spreading. Its surface should be smeared with oil or vaseline to prevent it from being sticky and hard.

To apply to a wound, a bread poultice is better made by pouring boiling water on a slice of crumb of bread, cut thick, and when it has been sufficiently soaked and drained it should be used without any oil.

To disinfect and clean wounds a *charcoal poultice* is often ordered. It is made by adding some powdered wood charcoal to a poultice of equal quantities of bread and linseed meal. About ¼ to ½ ounce of charcoal would be needed, half of it being mixed in the poultice and the other half powdered over its surface. It is not easy to make.

Another disinfecting poultice is made with solution of *chlorinated soda*, one part of the soda to two of linseed poultice.

A *yeast poultice* is sedative, and is chiefly used for painful boils or carbuncles. It consists of six parts of beer yeast, fourteen parts of flour, and six parts of water at the temperature of 100° F. These are mixed and placed near a fire until the mass rises, but care must be taken that they do not boil, as this destroys their efficacy.

A *hemlock poultice* is used to relieve the suffering in cancer and other painful diseases. One ounce of hemlock leaves and 3 ounces of linseed meal are mixed together, and 10 ounces of boiling water are gradually stirred up with them.

Poppy heads and camomile flowers make a sedative poultice. Boil the poppy heads until soft, remove the seeds, crush up the heads, and mix with camomile flowers which have been also boiled. It retains its heat for a long time, and is useful for neuralgia and toothache.

The sprinkling of laudanum on the various poultices renders them more sedative.

Counter-irritation.

The method of treatment called counter-irritation is employed to relieve pain and inflammation. It consists in the application of irritation to the skin, by which its blood-supply is much increased and the blood thus drawn from other parts. It may be applied at a distance from the diseased part, as in putting the feet in mustard and water to relieve congestion of the brain; or quite close to it, as in the employment of a blister behind the ear to relieve inflammation of that organ. Many forms of counter-irritation are used, such as poultices, fomentations, compresses, liniments, blisters and setons. Several of these have been described. The seton is now seldom used; it was formed by passing a thread of silk through a fold of skin and fixing it in this position, a wound being thus produced which continued to discharge until the thread was withdrawn.

Blisters.

Blisters are used to set up counter-irritation, and are produced either by the application of a plaster of the desired size or by painting over the part some blistering fluid. The portion of skin to be treated with a blistering fluid should be well washed and dried, and the fluid painted on with a brush; a second coat is usually necessary after the first has dried, and care should be taken that the fluid does not run down the skin, as all the parts wetted with it will be blistered. The place should be covered with a layer of cotton-wool.

If a plaster is used to produce a blister it should be removed after six or eight hours.

As soon as the blister has formed it should be pricked in one or two places and the fluid allowed to run out, when it should be absorbed by a piece of lint or cotton-wool; it must not be allowed to touch the skin, as it is very irritating. It is important not to drag away the loose skin that covers the blister; if this is removed it leaves a raw and very painful sore, which takes a long time to heal. The part should be covered with cotton-wool or ointment on lint, according as the doctor may direct.

Plasters.

Plasters are employed for various purposes—some for their stimulating effect, others for their soothing properties; some to reduce inflammatory thickening, others to support, strengthen or fix a part. Of the stimulating variety mustard and blistering plasters are the chief; of the sedative, belladonna, aconite, cocaine, opium and menthol; of the absorbent, mercury or Scott's dressing; and of the supporting, lead or diachylon.

The *belladonna plaster* is an especial favourite. It is used to relieve pain from neuralgia or muscular strain, and is sold of a suitable shape to apply to the breast to check the secretion of milk. Before applying a plaster, the skin should be well washed and dried; the plaster should be warmed before the fire, or by holding its back against a jug of hot water, and it should then be laid on the skin and retained in position for a minute or two by pressure of the hand. It should be worn until it gets loose, the edges being trimmed off with scissors when they cease to stick. After its removal the stickiness can be cleaned off the skin with spirits of turpentine, a poultice or olive oil; the spirits of turpentine must, however, be used with care if the plaster has left the skin tender.

Belladonna plasters often produce a most irritating eruption.

Ointments.

Ointments are fatty preparations, in which active agents, either sedative or stimulant, are contained. *Boracic ointment* is one of the most useful for all skin affections and wounds; it is mildly antiseptic. *Zinc ointment* also can be applied to wounds, and is more stimulating. *Mercury ointment* and *iodide of potash ointment* are used to reduce inflammatory swellings and enlarged glands. *Opium and gall ointment* is of great value in treating piles. A very thin ointment made of equal parts of *extract of belladonna* and *glycerine* is used to relieve the pain of inflamed parts. These preparations may either be applied direct to the skin, or may be spread on the surface of a piece of lint.

Ointments are sometimes employed to introduce drugs into the system through the skin, and thus avoid irritation of the stomach when this organ is very sensitive or the drug is very irritating. Mercury is the chief medicine taken by this method, which is known as "inunction."

Liniments.

Liniments are employed for several purposes—to relieve pain, to produce counter-irritation, to remove the swelling and thickening of an injured part, and to improve the nutrition of wasted and paralysed muscles. *Belladonna*, *opium* and *aconite* liniments are sedative; they should be smeared over the painful parts or gently rubbed in. *Turpentine*, *camphor* and *soap* liniments are stimulating, and should be rubbed in with plenty of friction.

Many prescriptions have already been given in the Treatment sections of our various chapters; to the present chapter we append a list of such as are likely to be found generally useful, in the form of mixtures, pills, gargles, inhalations, lotions and cachets. To this is added a list of tablets and tabloids, etc.

MIXTURES AND PILLS

157.—*Citrate of Iron Mixture*

Citrate of iron and ammonia	80 grains.
Carbonate of ammonia	24 grains.
Spirit of chloroform	2 drachms.

Water to 8 ounces.

An eighth part to be taken 3 times a day after food.

158.—*Steel Mixture*

Tincture of perchloride of iron	80 drops.
Spirit of chloroform	2 drachms.
Glycerine	1½ drachms.

Water to 8 ounces.

An eighth part to be taken 3 times a day after meals.

159.—*Steel and Quassia Mixture*

Tincture of perchloride of iron	80 drops.
Spirit of chloroform	2 drachms.

Infusion of quassia to 8 ounces.

An eighth part to be taken 3 times a day after meals.

160.—*Iron and Strychnia Mixture*

Syrup of the phosphate of iron	1 ounce.
Solution of strychnia	24 drops.

Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day before meals.

161.—*Quinine and Iron Mixture* (1)

Sulphate of quinine	8 grains.
Tincture of steel	80 drops.
Spirit of chloroform	2½ drachms.

Water to 8 ounces.

An eighth part to be taken 3 times a day.

162.—*Quinine and Iron Mixture* (2)

Sulphate of quinine	8 grains.
Sulphate of iron	16 grains.
Dilute sulphuric acid	8 drops.

Water to 8 ounces.

An eighth part to be taken 3 times a day.

163.—*Tonic Quinine Mixture*

Sulphate of quinine	16 grains.
Dilute sulphuric acid	½ drachm.
Syrup of orange	½ ounce.

Water to 8 ounces.

An eighth part to be taken 3 times a day.

164.—*Strong Quinine Mixture*

Sulphate of quinine	40 grains.
Dilute sulphuric acid	½ drachm.
Syrup of orange	½ ounce.

Water to 8 ounces.

An eighth part to be taken every 4 hours for malaria.

165.—*Bark and Ammonia Mixture*

Compound tincture of bark	½ ounce.
Carbonate of ammonia	24 grains.
Syrup of orange	½ ounce.

Water to 8 ounces.

An eighth part to taken 3 times a day before meals.

166.—*Bark and Iodide of Potash Mixture*

Compound tincture of bark	½ ounce.
Carbonate of ammonia	24 grains.
Iodide of potash	24 grains.
Tincture of orange	2½ drachms.

Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day before food.

167.—*Rhubarb and Gentian Mixture*

Infusion of rhubarb	4 ounces.
Compound tincture of gentian	½ ounce.
Bicarbonate of soda	80 grains.
Spirit of chloroform	80 drops.

Peppermint water to 8 ounces.

An eighth part to be taken 3 times a day before meals.

168.—*Nux Vomica and Acid Mixture*

Tincture of nux vomica	80 drops.
Dilute nitrohydrochloric acid	80 drops.
Syrup of lemon	½ ounce.

Water to 8 ounces.

An eighth part to be taken 3 times a day before meals.

169.—*Gentian and Soda Mixture*

Bicarbonate of soda	2 drachms.
Dilute hydrocyanic acid	16 drops.

Compound infusion of gentian to 8 ounces.

An eighth part to be taken 3 times a day.

170.—*Gentian and Acid Mixture*

Dilute hydrochloric acid	2 drachms.
Dilute hydrocyanic acid	16 drops.

Compound infusion of gentian to 8 ounces.

An eighth part to be taken 3 times a day after meals.

171.—*Bark and Acid Mixture*

Compound tincture of bark	3 drachms.
Dilute nitrohydrochloric acid	80 drops.
Syrup of orange	½ ounce.

Water to 8 ounces.

An eighth part to be taken 3 times a day.

172.—*Calumba and Soda Mixture*

Bicarbonate of soda	80 grains.
Tincture of calumba	2½ drachms.

Infusion of orange peel to 8 ounces.

An eighth part to be taken 3 times a day before meals.

173.—*Heart Tonic*

Tincture of digitalis	40 drops.
Tincture of steel	80 drops.
Glycerine	3 drachms.

Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day.

174.—*Gout Mixture* (1)

Iodide of potash	24 grains.
Colchicum wine	80 drops.
Spirit of chloroform	2½ drachms.

Infusion of senega to 8 ounces.

An eighth part to be taken 2 or 3 times a day.

175.—*Gout Mixture* (2)

Bicarbonate of potash	1½ drachms.
Colchicum wine	3 drachms.
Tincture of ginger	2 drachms.

Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day.

176.—*Carminative Mixture*

Powdered ginger	40 grains.
Powdered rhubarb	40 grains.
Bicarbonate of soda	80 grains.
Sal volatile	2½ drachms.

Cinnamon water to 8 ounces.

An eighth part to be taken every 4 hours as necessary.

177.—*Salicine Mixture*

Salicine	2 drachms.
Bicarbonate of potash	2 drachms.
Tincture of orange	½ ounce.

Chloroform water to 8 ounces.

An eighth part to be taken every 2, 3, or 4 hours.

178.—*Salicylate of Soda Mixture*

Salicylate of soda	2 drachms.
Bicarbonate of potash	2 drachms.
Bromide of potash	80 grains.
Compound tincture of cardamoms	½ ounce.
Spirit of chloroform	2 drachms

Water to 8 ounces.

An eighth part to be taken every 2, 3, or 4 hours.

179.—*Indigestion Mixture* (1)

Carbonate of bismuth	80 grains.
Bicarbonate of soda	80 grains.
Mucilage of tragacanth	1 ounce.

Compound tincture of cardamoms	½ ounce.
Spirit of chloroform	80 drops.

Cinnamon water to 8 ounces.

An eighth part to be taken 3 times a day, before meals.

180.—*Indigestion Mixture* (2)

Carbonate of bismuth	60 grains.
Compound powder of tragacanth	30 grains.
Bicarbonate of soda	2 drachms.
Compound tincture of cardamoms	3 drachms.
Tincture of nux vomica	30 drops.

Infusion of calumba to 8 ounces.

An eighth part to be taken 3 times a day before meals.

181.—*Indigestion Mixture* (3)

Glycerine of pepsin	1 ounce.
Tincture of euonymus	1½ drachms.
Tincture of orange	1 drachm.
Glycerine	4 drachms.

Distilled water to 8 ounces.

A tablespoonful to be taken 3 times a day before food.

182.—*Liver Mixture* (1)

Dilute hydrochloric acid	80 drops.
Tincture of nux vomica	80 drops.
Tincture of orange	2½ drachms.

Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day after meals.

183.—*Liver Mixture* (2)

Bicarbonate of soda	2 drachms.
Tincture of nux vomica	80 drops.
Juice of dandelion	½ ounce.
Syrup of ginger	½ ounce.

Water to 8 ounces.

An eighth part to be taken 3 times a day before meals.

184.—*Flatulence Mixture*

Bicarbonate of soda	60 grains.
Sal volatile	3 drachms.
Tincture of capsicum	40 drops.
Tincture of nux vomica	45 drops.
Compound tincture of cardamoms	3 drachms.

Chloroform water to 6 ounces.

A tablespoonful to be taken as a dose and repeated in 2 hours if necessary.

185.—*Acid and Pepsin Mixture*

Dilute nitrohydrochloric acid	1½ drachms.
Glycerine of pepsin	1 ounce.
Tincture of orange	2 drachms.

Compound infusion of gentian to 8 ounces.

An eighth part to be taken 3 times a day with meals.

186.—*Effervescent Mixture*

Bicarbonate of soda	2 drachms.
Tincture of nux vomica	80 drops.
Tincture of lemon	2½ drachms.

Water to 8 ounces.

Mix, and label No. 1.

Citric acid	80 grains.
Syrup	½ ounce.

Water to 8 ounces.

Mix, and label No. 2.

One or two tablespoonfuls of each to be mixed and taken during effervescence 3 times a day.

187.—*Paregoric Cough Mixture*

Paregoric	2 drachms.
Ipecacuanha wine	24 drops.
Tincture of henbane	1½ drachms.

Water to 8 ounces.

An eighth part to be taken every 4 hours.

188.—*Ipecacuanha and Squills Mixture*

Ipecacuanha wine	2 drachms.
Tincture of squills	1 drachm.
Laudanum	½ drachm.
Treacle	½ ounce.

Water to 8 ounces.

An eighth part to be taken every 4 hours.

189.—*Ammonia and Senega Mixture*

Carbonate of ammonia	½ drachm.
Spirit of chloroform	1½ drachms.

Infusion of senega to 8 ounces.

An eighth part to be taken every 4 hours.

190.—*Carbonate of Ammonia Mixture*

Carbonate of ammonia	40 grains.
Spirit of chloroform	2½ drachms.
Mucilage of gum	2 ounces.

Water to 8 ounces.

An eighth part every 4 hours.

191.—*Expectorant Cough Mixture*

Ipecacuanha wine	40 drops.
Solution of acetate of ammonia	1 ounce.
Sweet spirit of nitre	½ ounce.

Camphor water to 8 ounces.

An eighth part to be taken every 3 or 4 hours.

192.—*Cough Mixture*

Syrup of poppies	1 ounce.
Tincture of squills	2 drachms.
Dilute sulphuric acid	80 drops.

Spearmint water to 8 ounces.

An eighth part to be taken every 3 or 4 hours.

193.—*Sedative Cough Mixture*

Paregoric elixir	2½ drachms.
Oxymel of squills	2½ drachms.
Sweet spirit of nitre	2½ drachms.

Water to 8 ounces.

An eighth part every 4 hours.

194.—*Cough Linctus* (1)

Solution of hydrochlorate of morphia	5 drops.
Chloroform	8 drops.
Rectified spirit	72 drops.

Glycerine to 1 ounce.

One teaspoonful to be taken every 4 hours in half a winglassful of water.

195.—*Cough Linctus* (2)

Confection of hips	100 grains.
Tragacanth in powder	6 grains.
Syrup of poppies	36 drops.
Vinegar of squill	36 drops.
Acetic acid	2 drops.

Boiling water to 1 ounce.

One teaspoonful to be taken occasionally if the cough is troublesome.

196.—*Bromide of Potash Sedative Mixture*

Bromide of potash	2½ drachms.
Syrup of orange	½ ounce.

Water to 8 ounces.

Two or three tablespoonfuls to be taken at bedtime.

197.—*Sleeping Draught*

Bromide of potash	15 grains.
Hydrate of chloral	10 grains.

Chloroform water to 1 ounce.

The draught to be taken at bedtime.

198.—*House Mixture* (*aperient*)

Sulphate of magnesia	2 ounces.
Powdered rhubarb	1 drachm.
Jalap	1 drachm.

Peppermint water 7 ounces.

A sixth part to be taken for a dose.

199.—*White Mixture* (*aperient*)

Sulphate of magnesia	1½ ounces.
Carbonate of magnesia	1 drachm.

Peppermint water to 8 ounces.

An eighth part be to taken for a dose.

200.—*Black Draught* (*aperient*)

Sulphate of magnesia	2 ounces.
Oil of peppermint	2 drops.

Infusion of senna to 12 ounces.

Two or three tablespoonfuls to be taken for a dose.

201.—*Laxative Mixture*

Liquid extract of cascara	½ ounce.
Liquid extract of liquorice	½ ounce.
Bicarbonate of soda	20 grains.

Chloroform water to 4 ounces.

Dose, from a dessertspoonful to two tablespoonfuls.

202.—*Diarrhœa Mixture* (1)

Aromatic powder of chalk	½ ounce.

Cassia water to 8 ounces.

An eighth part to be taken every 3 or 4 hours.

203.—*Diarrhœa Mixture* (2)

Dilute sulphuric acid	2 drachms.
Tincture of opium	1 drachm.
Spirit of chloroform	1½ drachms.

Water to 8 ounces.

An eighth part to be taken every 4 hours.

204.—*Diarrhœa and Cholera Mixture* (Board of Health)

Aromatic confection	72 grains.
Aromatic spirit of ammonia	72 drops.
Tincture of catechu	½ ounce.
Compound tincture of cardamoms	2½ drachms
Tincture of opium	24 drops.

Chalk mixture to 8 ounces.

An eighth part to be taken every 3 or 4 hours.

205.—*Astringent Mixture*

Gallic acid	2 drachms.
Dilute sulphuric acid	2 drachms.

Water to 8 ounces.

An eighth part to be taken every 4 hours.

206.—*Emetic Draught*

Sulphate of zinc	20 grains.
Ipecacuanha wine	½ ounce.

Water to 1 ounce.

To be taken immediately and followed by draughts of warm water.

207.—*Tape-Worm Draught*

Liquid extract of male fern	1 drachm.
Syrup of ginger	1 drachm.
Tincture of quillaia	½ drachm.

Distilled water to 1½ ounces.

To be taken fasting.

208.—*Fever Mixture*

Solution of acetate of ammonia	1 ounce.
Sweet spirit of nitre	½ ounce.
Salicylate of soda	1 drachm.
Syrup of orange	3 drachms.

Water to 8 ounces.

An eighth part every 3 or 4 hours.

209.—*Ether and Ammonia Mixture* (*a rapid Stimulant*)

Spirit of ether	1 drachm.
Aromatic spirit of ammonia	1 drachm.

Camphor water to 4 ounces.

A fourth part to be taken for faintness.

210.—*Iron and Aloes Pill*

Sulphate of iron (dried)	12 grains.
Extract of aloes	12 grains.
Soap	24 grains.

Oil of chamomile 4 drops.

Make twelve pills. One to be taken 3 times a day.

211.—*Nux vomica and Aloes Dinner Pill*

Extract of aloes	18 grains.
Extract of nux vomica	6 grains.
Powder of ipecacuanha	6 grains.
Sulphate of quinine	12 grains.
Soap	6 grains.

Make twelve pills. One to be taken daily before dinner.

212.—*Dr. Baillie's Dinner Pill*

Extract of socotrine aloes	15 grains.
Powder of ipecacuanha	6 grains.
Powder of ginger	24 grains.
Syrup	A sufficiency.

Make twelve pills. One to be taken before dinner.

213.—*Podophyllin and Quinine Dinner Pill*

Sulphate of quinine	12 grains.
Podophyllin	1 grain.
Milk sugar	1 grain.
Green extract of belladonna	2 grains.
Extract of socotrine aloes	12 grains.

Make twelve pills. One to be taken daily with food.

214.—*Sir Andrew Clark's Liver Pill*

Aloin	6 grains.
Extract of nux vomica	6 grains.
Sulphate of iron	6 grains.
Powdered myrrh	6 grains.
Powdered hard soap	6 grains.

Make twelve pills. One pill to be taken at bedtime.

215.—*Marshall Hall's Pills (mildly aperient)*

Barbadoes aloes	12 grains.
Extract of liquorice	12 grains.
Hard soap, thinly sliced	12 grains.
Treacle	12 grains.
Distilled water	A sufficiency.

Make twelve pills. One or two to be taken at bedtime.

216.—*Abernethy's Pills (aperient)*

Compound extract of colocynth	36 grains.
Mercury pill	24 grains.

Make twelve pills. One to be taken at bedtime.

217.—*Pills for Chronic Constipation*

Extract of cascara	12 grains.
Extract of nux vomica	1 grain.
Alcoholic extract of belladonna	1 grain.

Make twelve pills. One to three to be taken every night.

218.—*Dr. Gregory's Pills (aperient)*

Colocynth pulp (in powder)	9 grains.
Barbadoes aloes (in powder)	18 grains.
Scammony resin (in powder)	18 grains.
Sulphate of potash (in powder)	2½ grains.
Oil of cloves	2½ drops.
Distilled water	A sufficiency.

Make twelve pills. One or two to be taken at bedtime.

219.—*Gout Pills*

Colchicine	⅕ grain.
Extract of nux vomica	3 grains.
Extract of gentian	12 grains.

Make twelve pills. One to be taken 3 times a day after meals.

219A.—*Sir Benjamin Brodie's Gout Pills*

Acetic extract of colchicum	4½ grains.
Mercury pill	12 grains.
Compound extract of colocynth	12 grains.
Extract of rhubarb	12 grains.

Make ten pills. One to be taken 2 or 3 times a day.

GARGLES

220.—*Astringent Gargle* (1)

Glycerine of tannic acid 6 drachms.
Water to 8 ounces.

To be used warm for relaxed sore throat.

221.—*Astringent Gargle* (2)

Alum . . . 1½ drachms.
Acid infusion of roses to 8 ounces.

To be used warm for relaxed throat.

222.—*Antiseptic Gargle*

Glycerine of carbolic
acid . . . 3 drachms.
Water to 8 ounces.

To be used warm for "poison" throats.

223.—*Myrrh Gargle*

Tincture of myrrh . 3 drachms.
Honey . . . 3 drachms.
Acid infusion of roses to 8 ounces.

To be used warm for ulcerated throat.

224.—*Chlorine Gargle*

Powdered chlorate of
soda . . . 10 grains.
Hydrochloric acid . 30 drops.

To be mixed in an empty pint bottle, and the gas allowed to generate for 10 minutes; then add water to 1 pint, ¼ pint at a time, and shake between each addition. Used in diphtheria, scarlet fever and "poison" throats.

225.—*Soothing Gargle*

Chlorate of potash . 1½ drachms.
Boracic acid . . 1½ drachms.
Compound tincture of
lavender . . . 1 drachm.
Water to 8 ounces.

To be used with an equal quantity of warm water.

226.—*Cayenne Pepper Gargle*

Tincture of capsicum . 80 drops.
Dilute acetic acid . 25 drops.
Water to 8 ounces.

A stimulating gargle for chronic sore throat.

INHALATIONS

227.—*Benzoin Inhalation*

Compound tincture of
benzoin . . . 1 ounce.

One teaspoonful to be added to 1 pint of water at the temperature of 140°.

For inhalation in chronic bronchitis, pharyngitis and laryngitis.

228.—*Creasote Inhalation*

Creasote . . . 80 drops.
Light carbonate of magnesia . . . 30 grains.
Water to 1 ounce.

A teaspoonful to be added to a pint of water at 140°.

For inhalation in consumption, chronic laryngitis and bronchitis with offensive expectoration.

229.—*Respirator Inhalations*

Creasote and phenol, equal parts.
And
Creasote and chloroform, equal parts.

5 or 10 drops of either of these may be used on cotton-wool in an oro-nasal inhaler in consumption.

230.—*Chlorine Inhalation*

Chlorinated lime . 8 ounces.

Two to four tablespoonfuls of the powder to be moistened with cold water and the vapour inhaled for consumption, ozœna and chronic bronchitis with offensive expectoration.

231.—*Coniine Inhalation*

Juice of hemlock	2 drachms.
Solution of potash	½ drachm.
Distilled water	4 drachms.

About 20 drops to be placed on a sponge in an inhaler filled with hot water and the steam drawn through it. Used for bronchitis and whooping cough.

232.—*Ethereal Inhalation of Iodine*

Iodine	3 grains.
Ether	2 drachms.
Carbolic acid	2 drachms.
Creasote	1 drachm.
Rectified spirit	3 drachms.

Ten drops to be used on the pad or sponge of a respirator.

Inhalation used for consumption and chronic bronchitis.

233.—*Eucalyptus Inhalation*

Oil of eucalyptus	20 drops.
Light carbonate of magnesia	10 grains.
Water to 1 ounce.	

A teaspoonful to be added to 1 pint of water at the temperature of 140°, and the steam inhaled.

For nasal catarrh, consumption, chronic bronchitis and asthma. The oil of eucalyptus citriodora has a pleasant verbena scent.

234.—*Anti-catarrhal Salts*

Carbolic acid	1 drachm.
Oil of eucalyptus	1 drachm.
Oil of pine	½ drachm.
Strong solution of iodine	½ drachm.
Camphor	1 drachm.
Ammoniated alcohol	2 drachms.

Saturate pine sawdust or peat dust with the mixture, and preserve in glass stoppered bottles.

Useful for colds, hay fever, and influenza.

235.—*Pine Oil Inhalation*

Oil of Scotch pine	40 drops.
Or pinol	40 drops.
Or terebene	40 drops.
Light carbonate of magnesia	20 grains.
Water to 1 ounce.	

A teaspoonful to be added to 1 pint of water at the temperature of 140°. These are stimulating inhalations for use in chronic laryngitis and bronchitis and in consumption.

LOTIONS, ETC.

236.—*Lead and Opium Lotions*

Laudanum	2 drachms.
Solution of subacetate of lead	40 drops.
Water to 8 ounces.	

Poison. To relieve pain and inflammation.

237.—*Arnica Lotion*

Add 20 drops of tincture of arnica to half a cupful of water.

238.—*Evaporating Lotion*

Solution of subacetate of lead	1 drachm.
Rectified spirit	1 ounce.
Water to 8 ounces.	

239.—*Sulphur Lotion*

Flowers of sulphur	1 drachm.
Glycerine	1 ounce.
Rose water to ½ pint.	

Mix.

240—*Carbolic Acid Lotion*

Carbolic acid liquefied.

A tablespoonful to 1 pint of water makes a lotion of 1 in 40; a dessert-spoonful to 1 pint 1 in 80.

241.—*Red Wash for Wounds*

Sulphate of zinc .	2 grains.
Compound tincture of lavender . .	12 drops.

Water to 1 ounce.

To stimulate healing of a wound.

242.—*Antiseptic Eye Lotion*

Boric acid . .	8 grains.

Distilled water to 1 ounce.

To be used in an eye bath.

243.—*Astringent Eye Lotion*

Boric acid . .	5 grains.
Zinc sulphate . .	½ grain.

Distilled water to 1 ounce.

To be used in an eye bath.

244.—*Belladonna Eye Lotion*

Green extract of belladonna . . .	2½ grains.

Distilled water to 1 ounce.

Dissolve and strain. Soothing wash to dilate the pupil.

245.—*Throat Spray or Nasal Douche*

Glycerine of carbolic acid . . .	10 drops.
Bicarbonate of soda .	6 grains.
Biborate of soda .	6 grains.

Water to 1 ounce.

To be used warm.

246.—*Quinine Nasal Douche*

Sulphate of quinine .	1 grain.

Water to 1 ounce.

For use in hay fever.

247.—*A B C Sedative Liniment*

Liniment of aconite .	½ ounce.
Liniment of belladonna	½ ounce.
Liniment of chloroform	½ ounce.

To be rubbed into the painful part.

248.—*Sedative Application*

Extract of belladonna	½ ounce.
Glycerine . . .	½ ounce.

To be smeared over the inflamed or painful part.

249.—"*Hartshorn and Oil*"

Solution of ammonia .	½ ounce.
Almond oil . .	1½ ounces.

Shake together. A stimulating liniment.

250.—*Dusting Powder*

Oxide of zinc . .	1 ounce.
Powdered starch .	2 ounces.

Mix. For external application. To keep the skin dry.

CACHETS

Antipyrin . . .	5–10 grains.
Aspirin . . .	5–10 grains.
Carbonate of bismuth	10 grains.
Cascara extract . .	2–5 grains.
Charcoal . . .	15–30 grains.
Dover's powder . .	5–10 grains.
Guaiacum and sulphur each	3 grains.
Pepsin . . .	5–10 grains.
Phenacetin . .	5–10 grains.
Rhubarb root . .	3–10 grains.
Saccharo-carbonate of iron . . .	10 grains.
Salicine . . .	10–15 grains.
Salol	5–15 grains.
Sulphate of quinine .	1–5 grains.
Sulphonal . . .	10–20 grains.
Trional . . .	10–15 grains.

USEFUL TABLETS AND TABLOIDS

Antifebrin	3 grains.
Aconite tincture	$\frac{1}{4}$, 1, or 5 drops.
Aloes and iron	4 grains.
Aloes and myrrh	4 grains.
Aloes, nux vomica and belladonna	4 grains.
Ammonium chloride	3 or 5 grains.
Ammonol	5 grains.
Anticonstipation	3 grains.
Antipyrin	$2\frac{1}{2}$ and 5 grains.
Aspirin	5 and 8 grains.
Apomorphine	$\frac{1}{100}$ and $\frac{1}{50}$ grains.
Aromatic chalk powder with opium	5 grains.
Arsenic	$\frac{1}{100}$ grain.
Belladonna tincture	1 and 5 drops.
Benzoic acid compound (lozenge).	
Bismuth carbonate	5 grains.
Bismuth, rhubarb and soda.	
Blaud's pill	5 grains.
Blue pill	4 grains.
Borax and cocaine (lozenge).	
Calomel	$\frac{1}{10}$ to 5 grains.
Caffeine citrate	2 grains.
Cascara	1 to 5 grains.
Charcoal	5 grains.
Coffee-mint.	
Chlorate of potash	5 grains.
Chlorate of potash, borax and cocaine (lozenges).	
Dover's powder	$\frac{1}{4}$ and 5 grains.
Easton syrup	$\frac{1}{2}$ and 1 drachm.
Ergotin	1 to 3 grains.
Exalgin	2 grains.
Gentian and soda.	
Gregory's powder	5 grains.
Grey powder	$\frac{1}{4}$ to 5 grains.
Guaiacum and sulphur	3 grains.
Ichthyol	$2\frac{1}{2}$ grains.
Ipecacuanha	$\frac{1}{10}$ and 5 grains.
Ipecacuanha with squills	4 grains.
Iron and arsenic compound.	
Iron and quinine citr.	3 grains.
Iron saccharo-carbonate	5 grains.
Jalap	5 grains.
Laudanum	2 to 10 drops.
Lead with opium	4 grains.
Liquorice compound powder	30 grains.
Lithia carbonate	2 grains.
Lithia citrate	5 grains.
Morphine sulphate	$\frac{1}{20}$ to $\frac{1}{4}$ grain.
Nitro-glycerine	$\frac{1}{200}$ to $\frac{1}{50}$ grain.
Nux vomica	1 to 10 drops.
Opium	$\frac{1}{2}$ and 1 grain.
Papain	2 grains.
Paregoric	2 to 15 drops.
Pepsin, bismuth and strychnia.	
Phenacetin	1 and 5 grains.
Phenacetin and caffeine.	
Phenalgin	$2\frac{1}{2}$ grains.
Podophyllin	$\frac{1}{8}$ to $\frac{1}{2}$ grain.
Potassium bicarbonate	5 grains.
Potassium bromide	5 and 10 grains.
Potassium chlorate	5 grains.
Potassium chlorate, borax and cocaine (lozenge).	
Potassium iodide	1 to 5 grains.
Quinine	$\frac{1}{2}$ to 10 grains.
Reduced iron	2 grains.
Rennet.	
Rhubarb and soda.	
Saccharin	$\frac{1}{2}$ grain.
Salicin	5 grains.
Salol	5 grains.
Santonin	1 to 3 grains.
Soda-mint.	

Sodium bicarbonate	5 and 10 grains.
Sodium salicylate	3 and 5 grains.
Sodium sulphate (compound).	
Sulphonal	5 grains.
Sulphur compound.	
Thirst quencher.	
Thyroid gland	½ to 5 grains.
Trional	5 grains.
Urotropine	3 to 7½ grains.
Vegetable laxative.	
Veronal	5 grains.
Voice.	
Warburg's tincture	30 drops.
Zymine	3 grains.

EFFERVESCENT TABLETS

Carlsbad salts.
Chlorate of potash.
Citrate of caffeine.
Citrate of lithia.
Salicylate of soda.
Sulphate of magnesia.
Sulphate of soda.

CAPSULES

Ammoniated quinine tincture	1 drachm.
Amyl nitrite	1 to 10 drops.
Cascara	½ and 1 drachm.
Castor oil	½ & 1 drachm.
Chloroform	10 to 60 drops.
Cod-liver oil	½ & 1 drachm.
Creasote	3 & 5 drops.
Easton's syrup	½ & 1 drachm.
Ether	30 drops.
Ethyl bromide.	
Ethyl iodide.	
Male fern extract	15 drops.

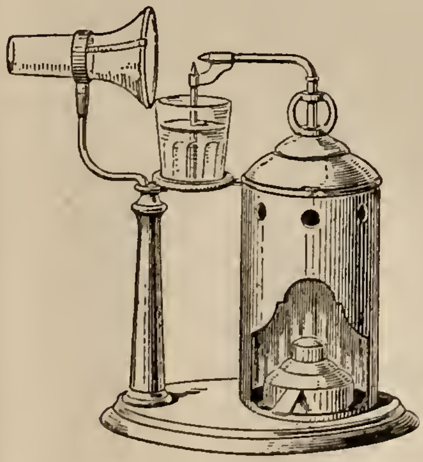


Fig. 63.—Steam Spray Inhaler.

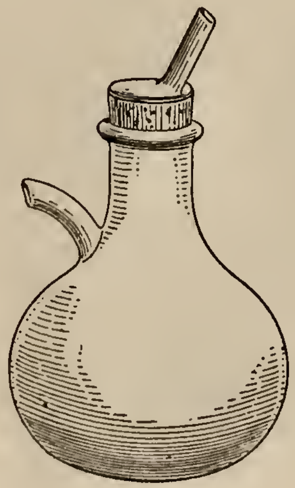


Fig. 64.—Hot-water Inhaler.

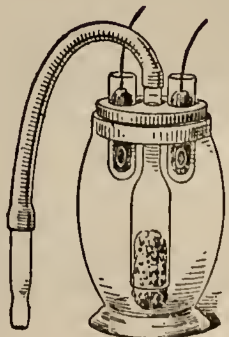


Fig. 65.—Inhaler for Chloride of Ammonium.

The inhalations Nos. 227, 228, 233, 235 (pp. 325–326) are for use in steam inhalers, but an ordinary jug is all that is required if the face be covered over with a towel. The hot water in many of these prescriptions is directed to be of the temperature of 140° F. (60° C.), and this is best obtained by mixing two parts of boiling water with one part of cold. Prescriptions 229, 232 are for dry inhalations, and are generally used in some form of respirator. The inhalation should be employed for as long a time as the doctor directs, but in consumption it is best to use it as continuously as can be borne. A useful dry inhaler can be obtained which can be charged with the drugs required and carried in the pocket. Another very useful inhalation is that of chloride of ammonium, which requires a special apparatus (Figs. 65 and 67) The air is drawn along tubes through two fluids, one being a solution of ammonia, the other hydrochloric acid, and white fumes of chloride of ammonium are formed, which, when washed by passing through water or a wet sponge, are quite unirritating. They are useful in catarrh of the air passages and Eustachian tubes.

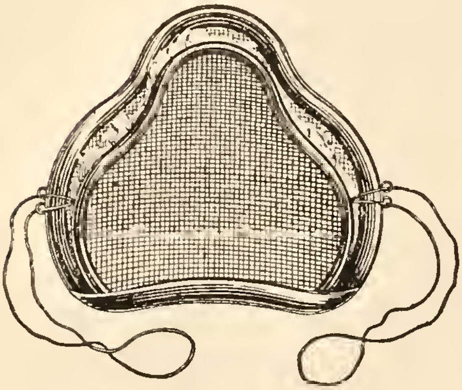


Fig. 66.—Oro-nasal Inhaler.

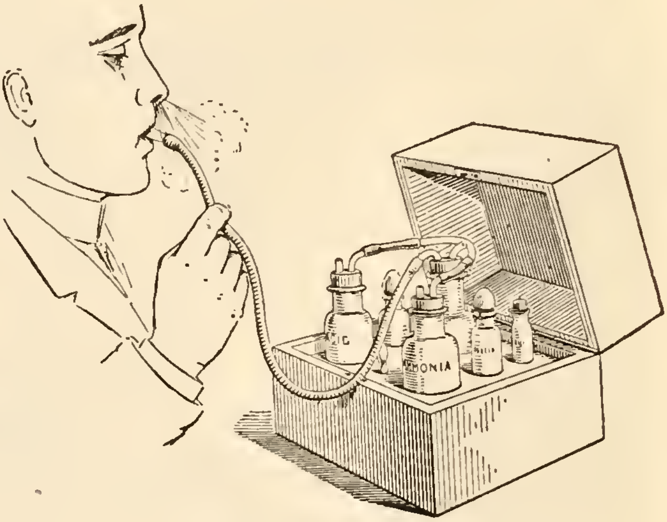


Fig. 67.—Vereker Inhaler.

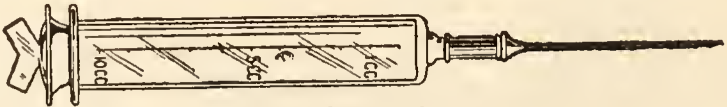


Fig. 68.—Serum Syringe.

CHAPTER XL

INVALID FOODS AND DRINKS

INVALID FOODS

Clear soup.—Take two pounds of fleshy beef, without fat or skin, from the silver side or buttock, and tie it round to make it compact. Put it into an enamelled saucepan or an earthenware pipkin, and let it brown over the fire for ten minutes. Turn it once during the time, and move it to keep it from burning, sticking a large fork into it to let the gravy escape. A few bones, free from marrow and fat, may be put under the meat. Pour on three pints of cold water, and add a small tablespoonful of salt. Let the liquor come very slowly to the boil, and carefully remove the scum as it rises. Throw in a teacupful of cold water, bring to the point of boiling, and skim again. Repeat this process three times. When no more scum rises, put in two carrots, a turnip, two onions, one leek, a bunch of parsley, four bay leaves, and four cloves; draw the pan to the side of the stove and simmer gently for four hours.

Celery soup.—Wash a single head of celery and boil it in as much salted water or chicken broth as will cover it. When quite tender rub it through a sieve. Mix a dessertspoonful of flour to a smooth paste with a little cold water, and pour on it three-quarters of a pint of hot milk. Season with pepper and salt, add the celery pulp, and a quarter of a pint of cream. Boil up once and serve.

Rice cream soup.—Wash two tablespoonfuls of Carolina rice and boil it gently in a pint of stock for about two hours or till quite soft. A short time before it is done, put a slice of onion and a stick of celery in a pint of milk, and simmer. When the milk is pleasantly flavoured pour it over the rice, press the whole through a sieve, and add pepper and salt. Make the soup hot, stir a gill of scalded cream into it and serve.

Raw meat juice.—Finely mince one pound of the best rump-steak, freed from all fat. Place it in an earthen vessel with sufficient water to well cover it, add some loaf sugar, and let it stand in a cool place, preferably on ice, for four hours. Strain it through muslin and squeeze out the remaining fluid with a lemon squeezer. It can be served with brandy or port wine.

Beef-tea (1).—Half a pound of gravy beef, half a pint of cold water, quarter teaspoonful of salt. Choose good gravy beef such as steak or topside. Remove the fat and skin, cut into thin strips and shred across with a sharp knife ; or it may be passed through a mincing machine. Put the shredded meat, cold water and salt into a saucepan, and if possible let it stand for fifteen minutes to soak. Commence to heat slowly ; stir gently all the time. The juice will come out of the meat, leaving it white. Cook gently until the liquid turns a rich red brown. Strain through a fine wire strainer ; remove any speck of grease by drawing a piece of paper across the top. It is then ready. N.B.—Beef-tea must never boil or it will be spoilt.

Beef-tea (2).—Made in a jar. Half a pound of gravy beef, half a pint of cold water, quarter teaspoonful of salt. Prepare the ingredients as in the foregoing recipe. Then put the shredded meat, water and salt into an earthenware jar. Cover and tie down with paper. Place the jar in a saucepan of boiling water, and keep it simmering for three hours ; the contents should be stirred from time to time. Then strain carefully and remove all trace of grease. It is now ready to serve.

Beef-tea (3).—Cooked in the oven. Prepare as for beef-tea (1), but place the jar in a cool oven for three hours. Strain and finish as before. This makes a very savoury, pleasant beef-tea, but from its strong taste is unsuited for those seriously ill.

Beef jelly.—Prepare beef-tea or beef juice in the usual way, and either boil with it a pound of knuckle of veal or add a teaspoonful of soaked gelatine to each quarter of a pint of tea. The gelatine should be boiled until dissolved, and stirred into the beef-tea, which may then be left till firm.

Chicken jelly is made of chicken broth, with gelatine added.

Meat panada.—Grate an ounce of stale breadcrumbs and soak them in milk for half an hour, then squeeze out the milk ; scrape an equal quantity of chicken or veal very fine with a knife ; pound together the meat and breadcrumbs in a mortar. This should be mixed with about three-quarters of a pint of chicken or veal broth or beef-tea and boiled until it thickens, when it is ready for use.

Chicken broth.—Half of a chicken, one quart of water, pepper and salt. Cut the chicken in small pieces, put it into a saucepan with the cold water; simmer gently for two or three hours, strain and season. If liked, an ounce of barley or rice may be cooked with it. A chopped onion would also make it more savoury. Giblets may be used instead of a whole chicken.

Mutton broth.—One pound scrag end of mutton, one quart of water, one dessertspoonful of pearl barley, one teaspoonful of chopped parsley, salt. Cut the mutton into small joints. Put it into a saucepan with the water. Add the salt and bring to the boil. Skim well. Add the barley. Simmer gently for three hours, keeping it well skimmed, then shake in the parsley. If vegetable flavouring is allowed, this broth is immensely improved by the addition of an onion, carrot and turnip, cut into dice and cooked in the broth.

Veal broth.—Take one pound of veal free from fat and bone, cut into small pieces the size of dice, place in a covered jar with a pint and a half of water or barley water, cold; place in an oven not too hot, and bake for three or four hours, or leave in the oven all night. Strain and remove fat.

Veal and tapioca broth.—Break into small pieces a pound of knuckle of veal or a calf's foot, and simmer in a quart of water until the liquid is reduced by one half. Strain and skim. Turn it into a clean saucepan with a tablespoonful of soaked tapioca and let it simmer for half an hour. Salt to taste. When the tapioca is clear, take it off the fire, add an egg lightly beaten, and three tablespoonfuls of cream. Stir over the fire for a minute or two, long enough to set the egg and serve. The broth must not boil after the egg is put into it.

Egg wine.—One egg, one glass of sherry, two lumps of sugar, half pint of boiling water. Beat up the egg well, add the sugar and sherry, pour the boiling water on to the egg. Return to the saucepan and stir till it thickens; do not boil or it will curdle. If liked, it can be served when the boiling water is poured on, and need not be cooked in the saucepan.

Egg flip.—One egg, one dessertspoonful of castor sugar, one glass of sherry or brandy. Stir the raw yolk and sugar in a tumbler till creamy, then add the wine. Beat the white to a stiff froth, and stir it lightly in. Half the juice of a lemon may be used instead of the wine if liked.

This preparation can be obtained from the chemist according to the recipe of the British Pharmacopœia under the name of brandy and egg mixture; it is flavoured with cinnamon water. Raw eggs may be beaten up with any kind of liquid food such as milk, beef-tea, or broth.

White wine whey.—Half a pint of milk, half a glass of sherry; sugar to taste. Boil the milk, pour the sherry in when boiling; it will curdle; strain through muslin. Serve the whey hot. The curds are indigestible. This is given sometimes as a hot drink for colds.

Port wine jelly.—Half a pint of port, three-quarters of a pint of water, one ounce of sheet gelatine, one ounce of sugar, two cloves, one inch of cinnamon, one lemon-rind, thinly peeled, two whites of eggs and shells, one dessertspoonful of red currant jelly, cochineal. Put half a pint of water, the gelatine, sugar, cloves, cinnamon, lemon-rind, the whites of eggs stiffly beaten and the shells into a saucepan, and whisk till it boils. Take off the fire, and add the port; strain through a cloth, dissolve the currant jelly in the other gill of water, and add after the jelly has been strained. Colour with cochineal, set in a mould, and turn out when firm.

Chicken milk.—Clean a fowl carefully, cut it into small pieces and break the bones. Put it into an enamelled saucepan with two or three peppercorns and a little salt, and the white part of a head of celery, barely cover it with cold water, bring it slowly to the boil, and simmer gently for four hours or more. Strain the broth into a bowl and leave it till cold, when it should form a stiff clear jelly. Carefully remove the fat from the top by wiping this jelly with a napkin dipped into hot water and squeezed dry. Take equal quantities of the jelly and milk, put them into an enamelled pan, boil, skim and serve.

Chicken cream.—A quarter of a pound raw chicken or veal, three-quarters of an ounce of butter, one egg, one white of egg whipped, half gill of cream. Pound the chicken in a mortar, add the whole egg and seasoning. Rub through a sieve, stir in half the whipped white of egg and the cream whipped. Place in small buttered moulds; steam gently for about fifteen minutes. Serve with a nice white sauce. Pheasant or game may be cooked in this way if wished.

Lemon jelly.—Half a pint of lemon juice, a pint and a half of water, six ounces of loaf sugar, one inch of cinnamon, four cloves, two and a half ounces of sheet gelatine, the rind of four lemons, thinly cut, two whites of eggs, and the shells. Put all these ingredients into a saucepan together; whisk until it boils. Let it stand for five minutes. Strain through a clean cloth scalded; set in a mould when clear. When it is firm, turn out. If wine is desired, one gill of sherry may be put in, and that quantity of water omitted.

It must always be remembered that gelatine and isinglass are of little or no value as nutrients, and are simply used to stiffen jellies. This applies to calf's-foot jelly, which is tempting and refreshing, but only derives its stimulating or nourishing properties from the wine, etc., added to it.

Arrowroot.—This may be made with either milk or water. The latter, however, would contain very little nourishment. A small dessertspoonful of arrowroot will thicken about half a pint of milk. The arrowroot should be placed first in a teacup or small basin, and should be thoroughly mixed with a small quantity of cold water till quite smooth. Then add by degrees the boiling milk, and continually stir the mixture. It may be flavoured with sugar and a little nutmeg or other kind of spice, or some lemon peel may be added.

Gruel.—One tablespoonful of groats or oatmeal, two tablespoonfuls of cold water, one pint of boiling water. Mix the groats smoothly with the cold water in a basin; pour over them the boiling water, stirring it all the time. Put it into a very clean saucepan, boil the gruel for ten minutes, keeping it well stirred; sweeten to taste and serve. It may be flavoured with a small piece of lemon peel by boiling it in the gruel, or a little grated nutmeg may be put in. When wine is allowed to the invalid, two tablespoonfuls of sherry or port make this preparation very nice. In cases of colds, the same quantity of spirits is sometimes added instead of wine. If fine oatmeal is used, it requires rather longer boiling.

Custard.—Beat up the yolk of four eggs with an ounce of castor sugar and three-quarters of a pint of milk; pour into a jug and heat in a saucepan of water, stirring all the time, so that the custard thickens without boiling. Serve cold in wineglasses with nutmeg grated over the surface, or flavour with a little orange flower water.

Baked custard may be prepared by pouring the above mixture into a pie-dish instead of a jug, and baking in a moderate oven for twenty minutes.

Savoury custard is made by substituting chopped meat, pepper and salt for sugar in the above.

Junket.—Make a pint of milk blood warm (about 98° F.); put it into a deep dish with one dessertspoonful of brandy, one dessertspoonful of sugar, and a teaspoonful of prepared rennet; stir all together, and cover over until set (about two hours). Then spread some thick or clotted cream over the top, grate some nutmeg, and strew some sugar over.

Cornflour.—Work a tablespoonful of cornflour into a paste with a little water. Take a quarter of a pint of milk and a quarter of a pint of water, and heat them in a saucepan, without boiling. Stir in the cornflour paste, and continue the stirring for three or four minutes after the mixture has thickened.

Blancmange.—Take cornflour two ounces, milk a pint, sugar one ounce. Mix the cornflour into a paste with a little cold milk. Boil the rest of the milk, stir in the cornflour, and boil until the original quantity has been reduced to two-thirds. Add sugar, pour into mould, and allow to set.

Rice pudding.—One ounce of rice, half a pint of milk, sugar to taste. Wash the rice without soaking it, add the milk, sweeten to taste, sprinkle slightly with nutmeg, bake one hour.

Semolina, tapioca and sago may be prepared in the same way.

PEPTONISED AND MALTED FOODS

The following recipes for peptonised (partially pre-digested) and malted foods are those of Sir William Roberts, a great authority on foods.

Peptonised soups, jellies and blancmanges.—Soups may be peptonised in two ways. Add an equal quantity of "stock" to peptonised gruel or peptonised milk gruel; or use peptonised gruel, thin and watery, instead of water, to make soup from shins of beef, etc.

To make jellies, add gelatine or isinglass to hot peptonised gruel, and flavour to taste. Blancmange may be made in a similar way with peptonised milk, and cream added.

The gruel or milk must be completely peptonised and boiled before being used, or the jellies will not set.

Peptonised beef-tea.—Mix one pound of finely minced lean beef with a pint of water, add ten grains of bicarbonate of soda. Simmer for one and a half hours in a covered saucepan. Pour off the beef-tea thus made into a covered jug. Beat up the meat left into a pulp with a spoon, and put it into the jug also; when it is cool enough to drink, add one tablespoonful of liquor pancreaticus and stir well. Put in a warm place for two hours, stirring occasionally. Boil for two or three minutes and strain, add salt; the beef-tea is then ready. Liquor pancreaticus, it may be added, can be procured from any chemist.

Peptonised milk.—Dilute a pint of milk with a quarter of a pint of water, boil half of it, and when boiling add the other half, which will bring it to the required temperature (140° F.). Add two teaspoonfuls of liquor pancreaticus and ten grains of bicarbonate of soda, pour into a covered jug, and stand in a warm place near the fire or under a cosy. At the end of an hour and a half boil for a minute or two. The food is then ready. The last boiling is to prevent the digestive processes going too far and spoiling the taste; it is possible to know when it has gone far enough by tasting the food—a slight bitterness should just be perceived. The preparation is more pleasant if the milk is skimmed beforehand and the cream added to it when ready.

Peptonised gruel.—Gruel made of flour, oatmeal, arrowroot, sago, barley, pea or lentil may be peptonised in the following way: Boil the gruel well and make it thick and strong; pour it into a covered jug and stand until lukewarm; add liquor pancreaticus, one dessertspoonful to each pint of gruel; stand in a warm place or under a cosy for two hours, then boil and strain. By this process both the starch and the nitrogenous ingredients are partially digested; the gruel becomes thinner, but does not get bitter, unless it has been made with milk.

Peptonised milk gruel.—Make a thick gruel, and add to it while boiling an equal quantity of cold milk. Add, for each pint, two or three teaspoonfuls of liquor pancreaticus and ten grains of bicarbonate of soda. Keep warm for an hour and a half, then boil and strain. If bitter, too much liquor pancreaticus has been added.

INVALID DRINKS

Lemonade.—Grate the rind of four large lemons, and mix with it one pound of sugar. Squeeze the juice of the four lemons, and pour over the sugar. Put all in a glass jar. Allow one tablespoonful for each glass of iced water.

Lemonade with eggs.—Pour one pint of cold water over three-quarters of a pound of sugar, and add to it the juice of five lemons.

Beat the yolks of three eggs until light, then beat the whites to a stiff froth and add the yolks and whites together. Pour a cupful and a half of cracked ice into the lemonade, then stir in the eggs and serve.

Iced tea.—In the morning when you have a fire put as many teaspoonfuls of tea in an earthen teapot as you have persons to use the beverage, and always allow one or two teaspoonfuls extra. Pour over it fresh boiled water and set it at the back of the stove, where it will steep, but never boil. In ten or fifteen minutes drain off in a jug, and when cold put it in the ice box. Serve in tumblers with a slice of lemon.

Tea à la Russe.—Peel a juicy lemon and cut in thin slices, taking out the seeds, put one slice in each teacup and sprinkle the lemon with sugar; pour hot tea over it. It should be served without cream.

Raspberry sharp.—Fill a two-quart glass jar with fresh red raspberries; pour over them cider vinegar until the jar is full. Screw the cover on and let them stand one week, then scald and pour into a jelly-bag, and let it drain; to the juice add one pound of loaf sugar to every pint. Boil fast for twenty minutes, and skim when any scum arises; while hot put into six bottles or glass jars. One spoonful in a glass of iced water makes a drink of delicious flavour.

Blackberry cordial.—This home-made drink is very valuable in hot weather as a preventive of diarrhœa. Squeeze enough blackberries to make a quart of juice, add a pound of loaf sugar, and let this dissolve, heating it slowly. Add to it one teaspoonful of cloves, cinnamon, and nutmeg. Boil all together for twenty minutes. On removing from the fire add a wineglassful of brandy. Put in bottles while hot and seal. Use a teaspoonful for a glassful of iced water.

Cream soda.—Boil together for a few minutes three pints of water and two pounds of white sugar, the juice of two lemons, and two ounces of tartaric acid. Set it away to cool. Beat the whites of three eggs to a stiff froth; slowly sift into it half a cupful of flour, and stir until smooth, then flavour with half an ounce of winter-green essence. When the syrup is nearly cool stir in the eggs. When cold put it in a stone jug which has been scalded until perfectly sweet. Cork tightly, and keep in a cold place. For a drink use two tablespoonfuls of this syrup in one glass of water, and just before drinking add a quarter of a teaspoonful of soda and stir well.

Toast and water.—Toast a piece of crust of bread till it is quite brown or almost black, place it in a jug, and pour some cold water upon it. After standing for a short time it is fit to drink.

Linseed tea.—Put one ounce of linseed and a pint of boiling water into a jar with a cover; stand this for an hour before the fire, and then strain. It may be flavoured with sugar or lemon peel.

Barley water.—Wash an ounce of pearl barley in cold water three or four times, or boil it for a few minutes. Then place the washed barley in a pint and a half of water, with a bit of lemon peel and a little sugar. Allow it to simmer, stirring it constantly until it is of a nice thickness; then strain it and add lemon-juice. If a *slight* flavour of lemon is preferred with a very little acid, put a slice of lemon with the barley in the water; sweeten to taste. Care must be taken not to make the drink too sweet, as it will then cloy the palate and produce flatulence. This is for use as a refreshing drink.

Barley water for infant's food.—Wash the barley as in preceding recipe. Place two teaspoonfuls of barley in a pint of cold water, and boil it down to three-quarters of a pint in an enamelled saucepan. Strain and use as directed.

Rice water.—Take an ounce of rice, an ounce of sugar, and a pint of cold water. Wash the rice, place it with the sugar and water in a saucepan, boil for one hour. Strain and serve cold.

Arrowroot water.—Add two teaspoonfuls of best arrowroot to a pint of water, and simmer for five minutes, stirring constantly.

Oatmeal water.—Add a tablespoonful of coarsely ground oatmeal to a pint of water, simmer gently for an hour, and replace the water evaporated.

Albumen water.—Dissolve the white of two eggs in a pint of water and flavour with orange-flower water and sugar.

Whey.—Take a pint of milk, boil half and mix the hot and cold portions together, add a dessertspoonful of rennet (*e.g.* Benger's) or a rennet tablet; stand it in a warm place. In a few minutes the curd will have separated from the whey. Break up the curd with a fork, and allow it to stand until the curd has subsided. Decant and boil the whey.

Apple water.—Pour a pint of boiling water over a couple of roasted apples; let it stand in a warm place for three hours. Strain and sweeten to taste.

Black currant water.—Allow two tablespoonfuls of black currant jam in a quart of water to simmer for half an hour, and then strain.

Tamarind water.—Place two ounces of dried tamarinds in three pints of water, boil for an hour, strain, and serve when cold.

Imperial drink.—Dissolve a drachm or a drachm and a half of cream of tartar in a pint of boiling water, and flavour with lemon peel and sugar. When cold, it may be taken freely as a cooling drink. It acts slightly on the kidneys, increasing the flow of water through them.

Nutritious coffee.—Half an ounce of ground coffee, one pint of milk. Let the coffee be freshly ground ; put it into a saucepan with the milk, which should be made nearly boiling before the coffee is put in ; and boil both together for three minutes ; clear by pouring some of it into a cup and then back again, and leave it on the hob for a few minutes to settle thoroughly. This coffee may be made still more nutritious by the addition of an egg well beaten and put into the coffee-cup.

Milk tea is made by using boiling milk instead of water when infusing the tea ; in this way is obtained all the pleasant flavour of the tea without the injurious ingredients, which are insoluble in milk.

CHAPTER XLI

THE SICK-ROOM

Choice of Room—Its Preparation—The Furniture—The Bed—Draw-sheet—Position of Bed—Nursing Appliances—Temperature of Sick-room—Ventilation—Disinfection and Disinfectants.

Choice of Sick-room.

Much of the comfort and peace of mind of a sick person depends upon his surroundings, and it is a matter of great importance to choose the most suitable room for his occupation. Not only must the patient's inclinations be considered, but the nature of his illness and the possibility of adapting the room to the nursing and general treatment of the case.

We will therefore try to give a clear idea of what a model sick-room ought to be, and the best choice must then be made according to circumstances. It would be an excellent plan, especially in large families with many children, to reserve a room, properly fitted, for the use of the sick. But in ordinary circumstances, whenever possible, the patient's own room should be chosen, as in it he will feel most at home, and less disturbance in the general household arrangements will follow; but in many cases it may be found quite unsuitable. The larger, brighter and more airy the room, the more suitable is it for an invalid. It should have a south or south-west aspect, so that it may get as much sunshine as possible, for whilst rooms which face north are cold and get but little sun, those which face east are affected by cold winds. In cases where the disease is serious or likely to be of long duration, it is often advisable to convert a sitting-room into the sick-room, and this is a particularly good plan if the room communicates with another by folding doors, as it enables the nurse to be always at hand without fear of disturbing the patient, and provides a good place for the preparation of the food, poultices, and other things which it is an advantage to keep out of the sick-room. It is essential that there be a fireplace and that the windows open both top and bottom. They should not open on to any court or enclosed place where there is an absence of fresh air or where dust and refuse are likely to collect, nor on to a public street where noises might occur and disturb the invalid.

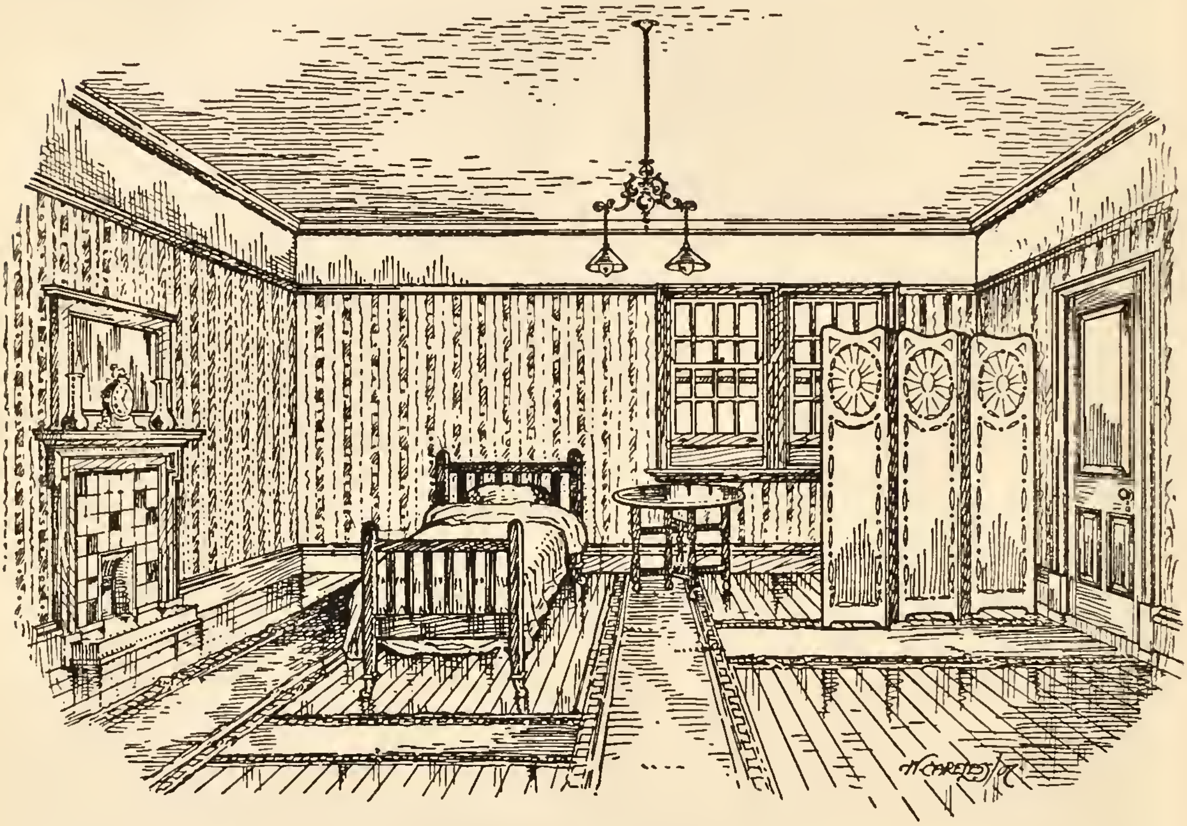

H. CARELESS, JR.

Fig. 69.—A Model Sick-room.

Preparation of Sick-room.

Everything unnecessary should be turned out of the room, especially all the larger pieces of furniture. The carpet should be taken up, the floor well scrubbed, the walls and furniture dusted. The carpet should be replaced with long mats or strips of carpet laid round the bed and in places where there will be much traffic; they can be easily removed from the room and shaken outside. The curtains, draperies of the bed, valences and hangings generally should be removed also, for they are traps for dust and dirt, and those only should be retained which may be useful in warding off draughts or in darkening the room when necessary. It is well that those retained should be of some light, prettily coloured washable material, and that they should be washed frequently.

A screen is useful to ward off draughts, and it should be placed between the bed and the door, or it may protect the patient from the heat of the fire or shelter his eyes from the light required by the nurse at night. A rough screen may be improvised by fastening a shawl or sheet over an ordinary clothes-horse, or by hanging either from a clothes-line. A few pictures and ornaments and some flowers which have not too strong a scent may be allowed to brighten the room; but flowers should always be removed at night, for while in the daytime, especially in sunlight, they give out oxygen and remove carbonic acid, thus purifying the air, at night they use up oxygen and give out carbonic acid. The water also in which they are placed should be changed daily, or it will give off an unpleasant smell.

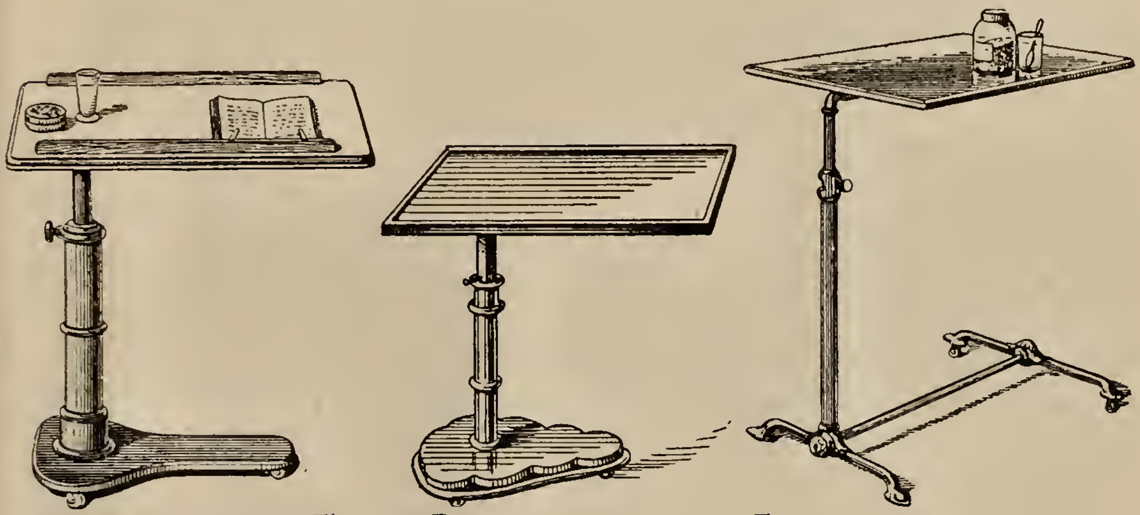


Fig. 70.—Bed-tables to stand on Floor.

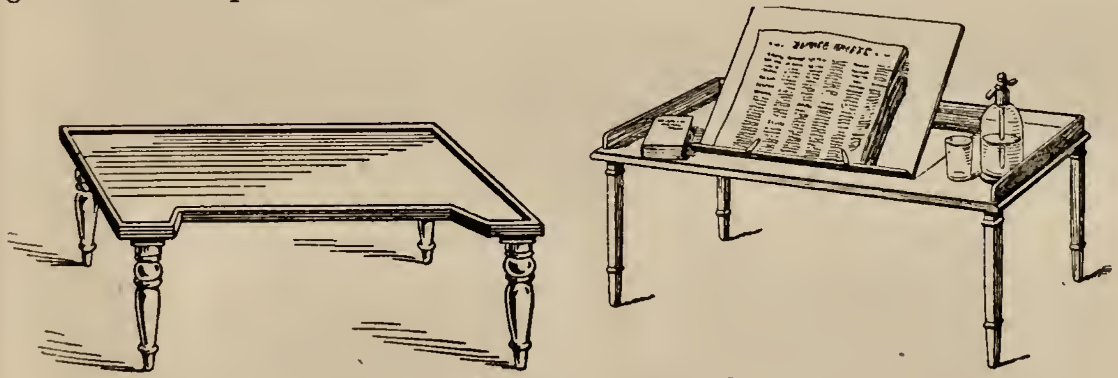


Fig. 71.—Tables to stand on Bed.

Bed-tables are made in two forms. The better and more expensive (Fig. 70) stand firmly on the ground, and have a telescopic leg by which

Bed-tables.

they can be raised and lowered. By an ingenious arrangement the table can be turned on one side, and then makes a reading desk. The other form might more correctly be called a bed-tray; it stands on the bed across the patient, and has legs long enough to keep the weight off his body (Fig. 71).

The Bed.

The bed should, for choice, be no more than 3 ft. 6 in. wide; if wider it adds considerably to the difficulties of nursing, and involves more movement on the part of the patient, which is obviously undesirable. The mattress should be of the wire-wove spring variety with a wooden frame, and on this should be placed a hair mattress, or if this is not available a flock or wool one, but never a feather bed, which is quite unsuited for illness. On the mattress should be placed a well-stretched blanket wide enough to tuck in on both sides, and then the under sheet, arranged in the same way, for any rucks or creases cause great discomfort.

Draw-sheet.

In all cases where the sheet may become soiled, a draw-sheet should be used. This consists of a large cotton sheet folded lengthwise into four and placed across the middle of the bed, so that it shall be under the patient's loins and thighs; it is tucked in on one side in the ordinary way, whilst on the other it should be neatly folded up and tucked in. As the part on which the patient lies becomes soiled, it is drawn away from under him, and a fresh, clean portion used, and the trouble and exertion of changing the sheets is thus avoided. A piece of double-face mackintosh should be laid between the under sheet and the draw-sheet or between the folds of the latter when the bedding requires protection from moisture, but should not otherwise be used, as it is likely to feel hot and uncomfortable to the patient. It should be about 6 inches narrower than the draw-sheet, and fixed firmly at each side of the bed with safety-pins. Over the invalid should be placed the upper sheet, one or two blankets, and a light coverlet or eiderdown quilt, the amount of covering being sufficient to keep the body warm without being too heavy. A bolster and several pillows will be required, and it is advisable to provide a separate cover for the bolster and not to wrap the sheet round it. One or two extra pillows, which should be soft and large, are useful to prop the patient up in bed when he is taking his food or wishes to sit up.

The bed should be placed between the window and the fireplace, with its head to the wall, and standing well out in the room so that the nurse can easily get to both sides of it. If possible, its foot should not be towards the window, or the light will shine straight into the patient's face. There is often a good deal of difficulty experienced by the invalid in moving himself and sitting up in bed, and comfort will be obtained by fixing an ordinary jack-towel to the upper bar of the foot of the bed and letting him pull on the other end and thus assist his nurses. A board placed across the foot is also an advantage, as it gives him something firm to keep his feet against, and prevents him from slipping down in the bed.

Position of Bed.

When a case of severe illness occurs, there are sure to be many articles which will be required and which are not likely to be in the house, and we will now consider what these would be, for they must be obtained without delay. They can all be either bought or hired at reasonable prices, and some instrument makers give especial attention to this branch of trade, and can always supply them at a moment's notice.

Sick-room Appliances.

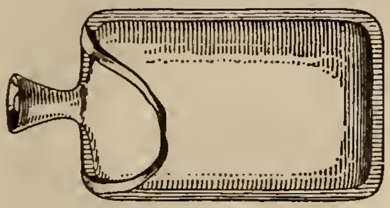


Fig. 72.—Indiarubber Hot-water Bottle.

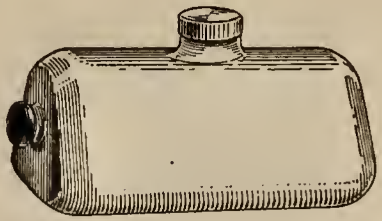


Fig. 73.—Earthenware Hot-water Bottle.

Hot-water bottles are sure to be wanted. They are of earthenware, tin, or indiarubber. Those of indiarubber are the more comfortable and more generally useful, although more expensive. The earthenware bottles are made flat at the bottom, to keep them steady, and with a screw stopper at the top, and are perfectly free from any danger of leakage if care is taken to screw in the stopper firmly. Indiarubber bottles are lighter and more suitable to apply to various parts of the body, and the tin bottles are made in various shapes for the latter purpose. These are all heated by being filled with hot water, and are employed for warming the body and for applying heat to painful parts; they should never be used without being covered with flannel or other woollen material, and special covers are sold for the purpose.

Dangerous burns are sometimes caused in paralysed or unconscious patients by placing very hot bottles without covers against them.

If hot bottles are not at hand, other means may be resorted to for applying heat to the body and warming the bed. Bags of salt or bran may be heated in the oven, a brick may be heated and wrapped up in flannel, or even a large black glass bottle may be gradually filled with boiling water—care being taken to avoid cracking it—and wrapped up in a flannel petticoat.

Water and air cushions, beds, and *pillows* are of great use in many cases. A water bed is almost a necessity in long and severe illness, or when a patient is permanently bedridden, especially from paralysis. In such cases the great difficulty the nurse experiences is to prevent the formation of bedsores, and a water bed is a great assistance, as it relieves the most sensitive parts from pressure and diffuses the weight of the body over a larger surface. Air and water pillows are made in various shapes and sizes—circular, square, and horseshoe—and can be made to accommodate themselves to different parts of the body, relieving them from pressure and giving support. These appliances can be filled with water of any desired temperature, or with air; but it is found by experience that a mixture of the two is generally the most comfortable; they are filled by a tube, which is fixed at one of the corners, and the water is prevented from escaping by a screw stopper. They

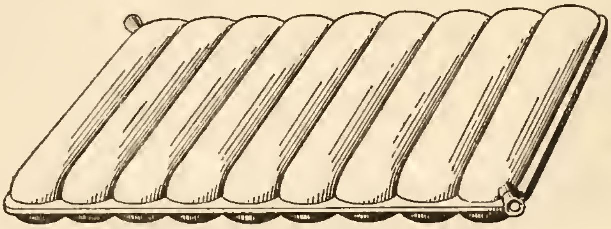


Fig. 74.—Air and Water Bed.

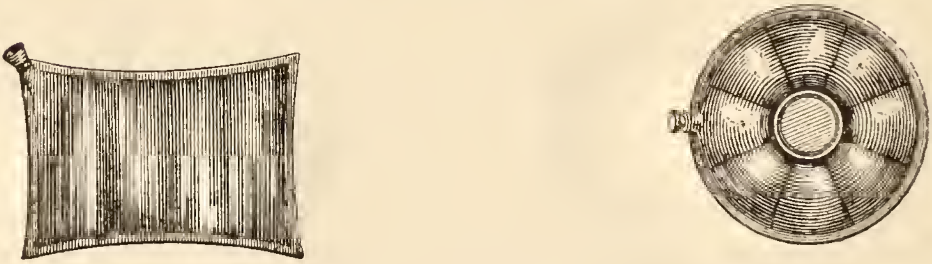


Fig. 75.—Air and Water Cushions.

should be half filled, and never distended with either water or air. Great care must be taken of indiarubber articles, as they are quite spoilt by the slightest prick or by grease of any sort.

Bed-rests or *back-rests* are a great convenience and comfort to invalids, enabling them to assume any position, from a recumbent to a sitting posture, without fatigue, and, by allowing them to change their position and alter the angle of the body, relieving much of the irksomeness of being bedridden. They are made in many patterns, but probably the simplest are the best. Pillows should be arranged on them to suit the patient's fancy, and it will be found that with the bed-rest the pillows can be arranged to much greater advantage, and are kept from slipping about and letting the patient fall back again into his old position. A very fair bed-rest can be extemporised by means of an ordinary light cane chair, which must be so placed that the back and rails are against the patient's back, whilst the legs project over the top end of the bed.

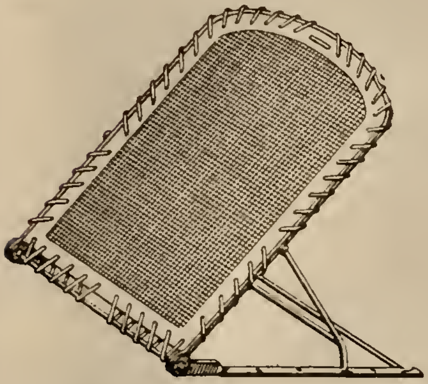


Fig. 76.—Back-rest.

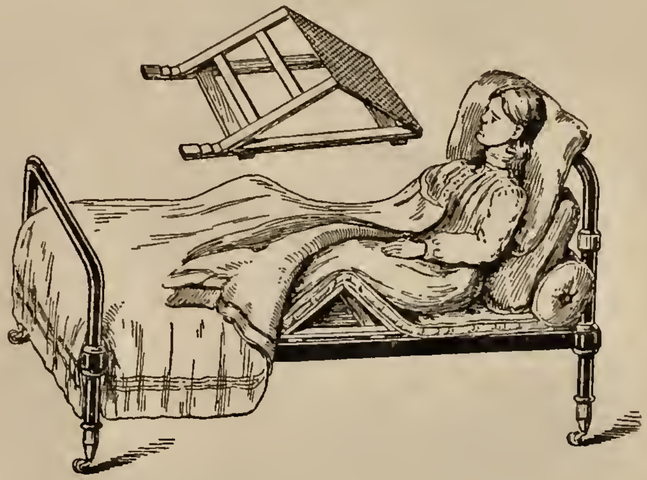


Fig. 77.—Sister Doris Bed-rest.

Leg-rests are useful to support a painful limb, as with a sprained ankle or a gouty foot. A long leg-rest is made by an inclined plane or board raised at the foot, or by the double inclined plane, which rises from both ends towards the centre. In using the first the hip joint is bent and the knee straight, whilst with the second

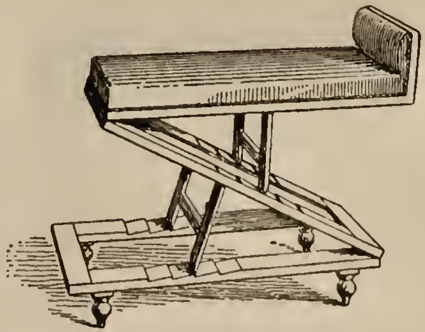


Fig. 78.—Leg-rest.

both joints are bent. The latter is a real boon to both nurse and patient in that it overcomes the great tendency the patient always has to slip down in the bed when in a sitting position. Another means of preventing this trouble is to place under the patient a small roll pillow with a strap fixed at each end, which can be attached to the head of the bed.

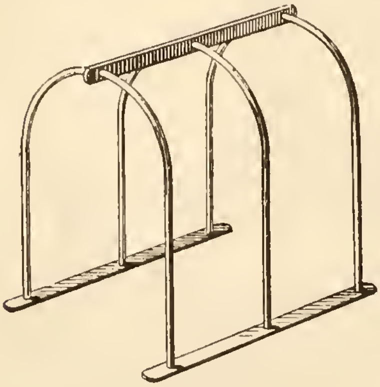


Fig. 79.—Bed Frame.

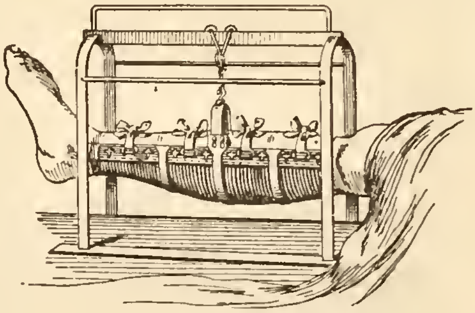


Fig. 80.—Salter's Swing.

Bed frames are used to keep the bedclothes off a very sensitive part. In hospitals these are shaped as in Fig. 79, and they may be hired from a surgical instrument maker's, but it requires little ingenuity to make one. A few strips of wood may be nailed together, or a bandbox without its cover may be utilised, a piece being cut out of its side

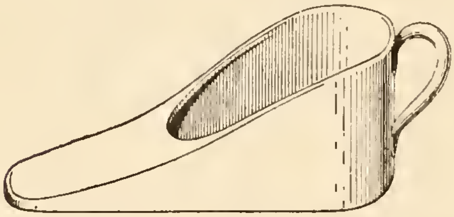


Fig. 81.—Earthenware "Slipper" Bed-pan.

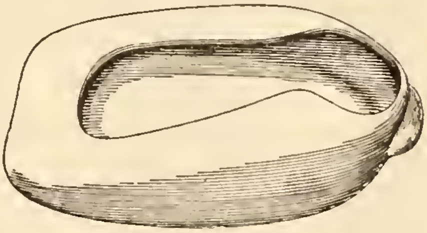


Fig. 82.—The "Perfection" Bed-pan.

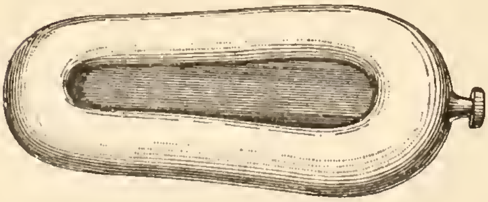


Fig. 83.—Indiarubber Bed-pan.

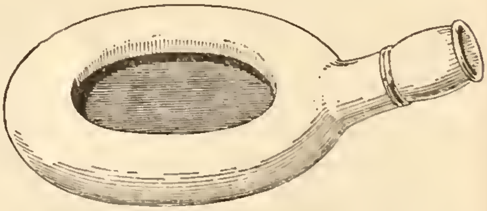


Fig. 84.—Circular Bed-pan.

large enough to admit the foot or arm as the case may be. The bed-clothes also may be lifted up and tied to the bottom of the bed, either by drawing a piece of string through them with a packing needle, or by passing a corkscrew through and then attaching that to the bed-foot by a piece of string.

One advantage of the hospital cradles, which it is difficult to imitate in an extemporary one, is that they are sufficiently strong to allow the leg to be swung from them on a splint by straps, as in the apparatus called Salter's Swing (Fig. 80); this permits of a good deal of freedom of movement, and is a great comfort to the invalid.

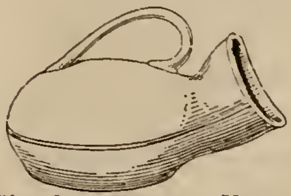


Fig. 85.—Female Urinal.

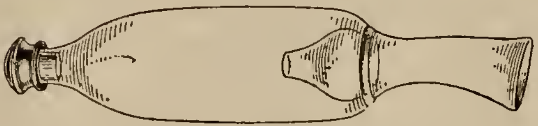


Fig. 86.—Male Urinal.

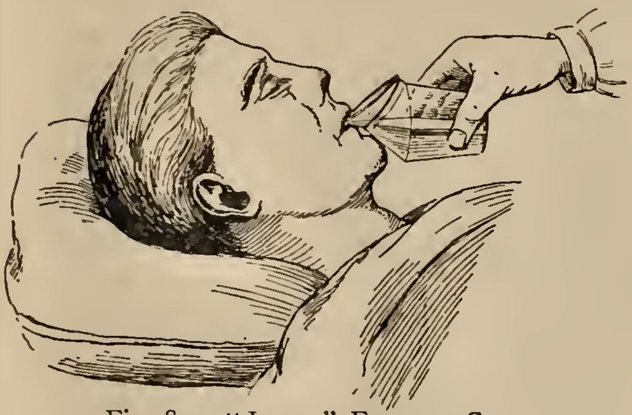


Fig. 87.—"Ideal" Feeding Cup.

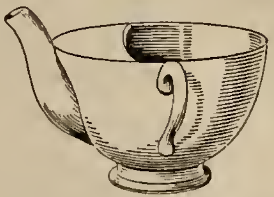


Fig. 88.—Feeding Cup with Spout.

Care is necessary in using bed-frames to prevent the patient's body from getting chilled. A light blanket should be laid over the part as far as it can be borne.

One of the greatest trials in illness is the use of the bed-pan, and yet it is often an absolute necessity, the patient being helpless or unable to get out of bed without endangering his life. Bed-pans are of many shapes; the ordinary circular one (Fig. 84) has an incurved edge and a hollow handle to pour off fluids; another is the slipper-shaped pan (Fig. 82), with a thin end to it, which makes it easier to introduce under the patient; another is "the cradle," which is hollowed; another is "The Perfection" (Fig. 82). Some are made of indiarubber with inflated rims.

It is necessary to pad or cover with flannel the earthenware pans, and a lid should be at hand to put on when the pan is being removed from the room. Except when the motion has to be kept for the doctor's inspection, some disinfectant should be placed in the pan before it is used, either carbolic acid, Condy's fluid or Sanitas being suitable.

Various kinds of *urinals* can be obtained, and must be used in cases similar to those requiring the bed-pan.

A *spittoon* is required when expectoration is profuse. Any small vessel may be used for the purpose, such as the bottom of a soap dish, a mug or a cup. The commonest form which is sold is like a mug with a cone-shaped coverpiece and central hole. In consumption expectoration is often very copious, and it is necessary to be careful of infection. The patient should use sanitary paper or little antiseptic pads which are sold for the purpose, and these should be burnt immediately after use. When the expectoration has to be preserved for medical inspection a spitting pot is necessary, but this should be cleaned with an antiseptic as soon as possible and the expectoration burned.

When the patient is obliged to lie flat on his back a good deal of difficulty is experienced in giving him his food, and *feeding cups* are then useful to give fluid nourishment and drinks. They are shaped like shallow cups, are half covered, and are provided with a long spout at one end and a handle at the other (Fig. 88). After a little practice the patient becomes quite proficient in their use. A very useful feeder, more like a tumbler in shape, is known as the "Ideal" feeding and drinking cup (Fig. 87).

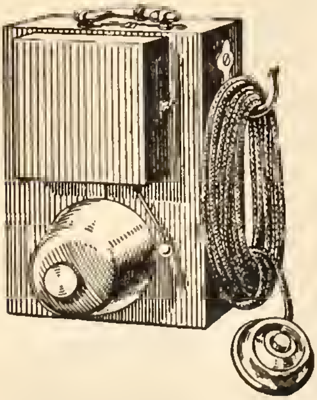


Fig. 89.—Electric Bell.

Another useful article in the sick-room is an electric bell by which the invalid can summon his nurse if at any time he is left unattended. The bell can be placed in the nurse's room, and the other end of the connecting wire placed close to his hand. These bells can be hired for a small sum.

There are many other ingeniously designed apparatus for the use of invalids, such as book-rests, electric and other lamps. During convalescence a writing-board will provide amusement; it has inkpot, blotting pad and writing requisites fixed upon it. This will help to while away many a weary hour.

Temperature of Room.

The temperature of the sick-room should be from 60° F. to 65° F., and endeavour should be made to keep it at as even a temperature as possible night and day. An ordinary thermometer should always be provided for the room, and may with advantage be hung at the head of the patient's bed, neither too near to the fire nor to the window; and an occasional glance at it should form part of the nursing routine. Particular attention is required during the early hours of the morning, for it is then that the temperature is liable to fall, and it may be necessary to close the windows for a time, not because night air is injurious—for this is a popular misconception—but because it is the coldest time of the four-and-twenty hours, and it is also the time when the body has least power of resistance to cold.

In certain diseases of the respiratory organs, such as bronchitis and laryngitis, it is necessary to maintain the room at a higher temperature than in other diseases. From 65° F. to 70° F. is then the proper heat, and the air should also be moistened by keeping a kettle steaming into the room—either a bronchitis kettle or an ordinary kettle with some device by which the steam is prevented from passing directly up the chimney. In pneumonia the temperature should be 60°, with plenty of fresh air, whilst in some fever cases, and in inflammation of the brain, it should be down to 55°.

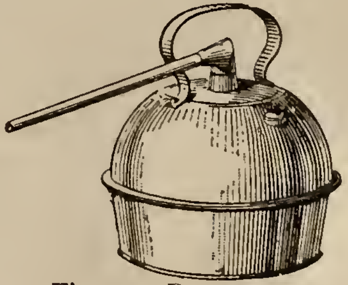


Fig. 90.—Bronchitis Kettle.

Ventilation.

A fire aids in keeping the sick-room fresh, cheerful, warm, and dry, and it should always be burning, except in really hot weather. It causes a continuous draught up the chimney, carrying off the impure air, of which the place is taken by fresh, admitted through an open window. "Doors are made to shut, windows to open," is a safe rule for the ventilation of the sick-room. The windows should be kept open day and night, and the extent to which they should be opened depends upon the temperature of the room. If the fire burns up too much and overheats the room, the windows should be opened a little more to let in a larger amount of cool air, and if the fire fails and the room gets cold the windows should be opened less widely.

A most useful and simple method of ventilation is provided by the Hinckes-Bird method, which consists in fitting below the bottom sash of the window a piece of wood about 6 inches deep, and long enough to reach across from one side of the frame to the other. The window is raised, the wood inserted and the sash then lowered on to it ; by this means the lower sash is prevented from quite closing, and the two sashes overlap each other in the middle of the window and allow free passage of air upwards into the room from outside ; and yet there is no draught felt, as the fresh air passes towards the ceiling.

In fine weather it is a good plan, especially if the room is small, to renew the air thoroughly three or four times a day. The patient should be covered, head and all, with an extra blanket ; the door and windows should be thrown widely open for a few minutes ; and the extra covering should not be removed until the room has regained its proper temperature.

Disinfection of the Sick-room.

It is most important thoroughly to disinfect the room when the illness is ended. All the underclothes and bed-linen, before being sent to the wash, should be well soaked in a 1 in 40 carbolic acid solution. They should not be sent to an ordinary laundry, and notice should be given that they come from an infectious case ; they will require to be well boiled in water containing plenty of soda. The mattresses, blankets, and any articles which would be injured by washing, should be disinfected by dry heat, which can only be done by professional cleaners. A less perfect disinfection can be carried out by hanging these things in the room whilst it is being fumigated.

To disinfect the room, as many articles as possible should be removed and disinfected, and those that remain should be placed so as to be thoroughly exposed : the mattresses should be stood up on end, articles of clothing and blankets should be hung upon lines across the room. The furniture, floors, woodwork and walls should be well scrubbed, first with soap and water, and then with carbolic lotion (1 in 40) or solution of perchloride of mercury (1 in 1,000) ; the paper should be scraped off the walls and burnt before washing. The room should then be fumigated with sulphur. The register should be closed and the windows made airtight by pasting brown paper over the cracks.

One or two metal pails half full of water should be placed on the floor; on these old iron dishes or trays should be supported, either on a pair of tongs laid across or on a couple of bricks stood in the pails. In these trays should be placed about 1 lb. of sulphur, which should be set alight with live coals or by pouring methylated spirit over it and igniting it. The room should then be vacated at once, the door closed and sealed up with paper on the outside and left unopened for twenty-four hours. After that time it may be entered cautiously, the windows thrown wide open, and the room left for some hours with the door closed to prevent the sulphur fumes from escaping into the house.

In the more severe diseases, such as small-pox, scarlet fever and typhus, the walls must always be stripped and limewashed before repapering, and the ceiling must be limewashed and whitened.

About 1 lb. of sulphur is required to fumigate a small room, and specially prepared sulphur candles can be obtained for the purpose.

The various substances which may be required in the sick-room to destroy germs and infective particles can be divided into three classes: (1) deodorisers, (2) disinfectants and (3) antiseptics.

Disinfectants.

The deodorisers render offensive smells inappreciable, but do not destroy germs; disinfectants decompose offensive substances and destroy germ life; and antiseptics prevent and retard putrefaction and destroy the living organisms which produce it.

The most commonly used disinfectants are carbolic acid, preparations of mercury, chlorinated lime, Sanitas, Condy's fluid and sulphur.

Carbolic acid is a most popular and generally useful antiseptic. It must be employed in strength according to the purpose for which it is required. One ounce (two tablespoonfuls) to 1 pint of water should be used for cleaning bed-pans and throwing down the closet; ½ ounce (one tablespoonful) to 1 pint of water for general purposes, such as the washing of clothes, wetting sheets, scrubbing floors and steeping infected articles; and half this strength for washing plates and dishes, spoons and crockery.

Two preparations of *mercury* are commonly employed—corrosive sublimate and biniodide; they are very active poisons, and can be most conveniently managed in the form of tablets. These tablets are made of different strength, but the best are those which require one tablet to 1 pint of water to make a 1 in 1,000 solution. This would be the strength to use for washing floors and furniture and for soaking clothes.

Chlorinated lime can be used as a powder for disinfecting the excreta, or mixed with water in the proportion of 2 oz. to 1 gallon for sprinkling on the floor, washing clothes or throwing down drains.

Sanitas will be found agreeable for removing smells and freshening up the sick-room in the form of a spray, or to stand about in saucers. It can be used also as a gargle or mouth-wash mixed with from four to six times as much water. *Condy's fluid* is also a very useful deodoriser. *Sulphur* is chiefly used as a gas for fumigating the sick-room.

CHAPTER XLII

THE UNPROFESSIONAL NURSE AND HER DUTIES

Choice of Nurse—Relations as Nurses—Duties of a Nurse—The Nurse Responsible—Cleanliness—Changing the Sheets—Lifting the Patient—The Patient's Clothing—Visitors—The Patient's Food—Feeding by Injection—Temperature—Temperature Charts.

I.—The Nursing of Ordinary Cases

Except by those who have passed through the experience it would hardly be believed how onerous and exhausting are the duties which fall upon those who undertake to nurse a severe case of illness. The strain is much enhanced if the nurse happens to be a relative, for to the physical fatigue of the nursing is then added the mental strain due to anxiety and solicitude prompted by affectionate regard for the invalid's welfare. Whilst on duty in the sick-room the nurse is kept constantly busy, and every moment seems to be occupied by some necessary duty. First there is the nourishment, next the medicine or some external application; the patient has to be made comfortable, the fire to be attended to or the room to be freshened, and so the nurse gets but little leisure whilst in attendance in the sick-room.

The Trained Nurse.

The importance of nursing in sickness is so well recognised by everyone that we have no hesitation in strongly advising, in all cases in which the illness is likely to be severe, that a trained nurse or nurses should be at once engaged. In the days of Sairey Gamp and Betsey Prig there must have been much doubt as to whether the patient would in any way benefit by being put under the care of ladies of their character and attainments. But the profession of nursing has so altered, and the nurse's training and education have reached so high a standard, that we now feel that to put those we love, when overcome by sickness, into the hands of a trained nurse is to do the very best we can for them.

Good nursing is second to nothing in the treatment of disease unless perhaps to good doctoring, and there are now so many institutions supplying first-rate trained nurses, that there is seldom any difficulty in obtaining their services at the shortest notice.

The Amateur Nurse.

But circumstances may arise in which it is unavoidable to undertake the nursing of even a bad case of illness without skilled assistance ; whilst in the milder complaints it may be thought unnecessary to incur the expense and possibly inconvenience of having a trained nurse in the house. In these cases the nurse has to be chosen from the patient's immediate friends or household, and it is for such that this and the two following chapters are written. Any woman having read them with care, and possessing ordinary intelligence and the natural instincts of her sex, may without hesitation undertake to fill the important position and carry out the doctor's directions.

Unfortunately there are many reasons why a near relative is not the best nurse for an invalid, and yet it is by such a one that the duty must often be undertaken. She cannot be expected to regard with the necessary calmness the suffering of one dear to her, and nothing is more trying to an invalid than to see constantly around his bed the too-anxious countenances of his family, whose doleful looks are often the cause of needless alarm. Again, a relative has not the necessary control, nor can she expect the ready acquiescence and obedience so essential to successful nursing. Invalid children, too, are proverbially naughty and perverse with their mothers, and yet the mother, when she takes the place of nurse, requires many unpleasant things from her child, who may have to take disagreeable medicines, undergo painful and trying treatment, and eat and drink things that are intensely disliked. Too often the strength of the invalid and the patience of the relative are wasted by peevish squabbles over food and medicine, squabbles which would never have occurred if a trained nurse, armed with the authority of her calling, had been in charge.

In all such matters the nurse must exercise much strength of mind, and must guard against excess of sympathy. A nurse should be sympathetic without being sentimental, and she must carry out the orders of the doctor without allowing her own feelings and ideas to influence her actions.

The chief duty of a nurse is to fulfil the directions of the doctor intelligently and conscientiously. She must also be unselfish, gentle, scrupulously clean, punctual, tidy, cheerful, good-tempered, firm and self-reliant. She must remember that her patient is not in a position to think for himself or decide questions on his own account, and that the best plan is to have a time for everything, and to do it without questioning. The medicine must be given, the food prepared, and the various forms of treatment carried out as part of a recognised routine which is necessary to restore the patient to health.

Duties of a Nurse.

Nursing requires constant observation of small things, the recognition of slight changes in the various symptoms, the strict carrying out of all treatment, and the careful and intelligent fulfilment of the many small duties of an often uninteresting and more or less disagreeable routine. It will therefore be necessary, in describing the duties of an untrained nurse, to enter fully into minutiæ, which may appear unimportant, but which together make all the difference in the management of a case of illness.

The Nurse responsible.

To begin with, the nurse for the time being should assume entire charge of the sick-room, and be responsible for all that takes place in it. If some one person does not take this duty upon herself, things will be sure to go wrong. Anybody's duty is nobody's duty, and divided authority is sure to lead to mistakes and confusion ; the patient's temperature will not be taken or the food or medicine will be forgotten, and the patient will suffer. The nurse must therefore see that everything is done, and done at the right time. She receives the doctor's orders, makes sure they are carried out, either by herself or her deputy when she is off duty, keeps a careful record of all that occurs in the sick-room, and reports everything to the doctor at his next visit.

Cleanliness.

Cleanliness in the sick-room is of the utmost importance. The nurse must be scrupulously clean in her own person, and in everything around her. Although she may not don the cotton dress and cap of her professional sister, she will be wise if she wears a washable apron and white cotton sleeves over her stuff ones, and changes both as soon as they become soiled, and washes her hands constantly, especially if she has had any dirty work to do. It is one of her most important duties also to keep her patient clean. The face and hands should be washed night and morning, or oftener, for this is very refreshing to the invalid, especially when he is feverish or perspiring freely. If he is not well enough to take a bath, the whole body should be washed over with warm water and soap once a day, if allowed by the doctor, a bath glove being used rather than the old-fashioned flannel, and then a sponge, and the face, hands, armpits and feet receiving special attention.

The bed should be protected with a mackintosh sheet and warm blanket or bath-towel laid underneath the patient. The room should be warm and free from draughts, and everything likely to be needed should be ready at hand. The nightdress should be removed, and only a blanket be kept as a covering; a small part of the body should then be exposed at a time, washed, dried and covered up again before proceeding farther. In cold weather or when there is any special liability to chill this proceeding can be entirely carried out under the blanket, very little water being used, but the whole body being gone carefully over with a sponge well squeezed out of warm water. After washing, some nourishment should be administered if the patient seems at all fatigued. The teeth should be cleaned regularly with a toothbrush, or with a piece of lint fastened on the end of a stick or in a pair of forceps, and moistened with some pleasantly scented antiseptic mouthwash. The hair should be carefully combed and brushed, as the patient can bear it, and in female patients should be neatly plaited into braids. The nurse must see also that the room is kept clean, and that the housemaid does her work thoroughly. All slops should be removed several times a day, and should never be left in the room for a longer time than is absolutely necessary.

Changing the Sheets.

Cleanliness of the bedclothes is of the utmost importance, for if they are allowed to become soiled they will irritate the skin and produce bedsores, which are a most serious complication and a real discredit to the nurse. The sheets must be changed immediately they become soiled, in spite of the trouble and fatigue to both nurse and patient, and both trouble and fatigue may be lessened by the methods we shall now describe, the particular method to be adopted depending upon the condition of the invalid and the amount of movement allowed him. The upper sheet should be changed from side to side as follows: Remove all the upper bedclothes except the top sheet and one blanket; draw out the top sheet from one side, whilst the assistant holds the blanket in place over the patient. Spread the clean sheet over the blanket, and whilst it is held in position by the assistant draw out the blanket and then replace the remaining bedclothes over the sheet.

Another and perhaps more expeditious method is to lay the clean sheet on one of the blankets, and place them over the bed, and whilst they are held withdraw the other clothes from under them. Or, the bedclothes being loosened all round, the sheet may be gradually drawn under the blankets from the foot, by two persons, one on either side of the bed, pulling up the sheet with one hand whilst the blankets are held in position with the other.

The method to be adopted for changing the under sheet depends much upon the condition of the patient, the complaint from which he is suffering and the amount of movement permitted him, and is a far more troublesome process.

If he is not very ill and may sit up, he should move down to the foot of the bed ; the soiled sheet can then be removed from the head portion of the bed and the clean one carefully arranged and tucked in ; he then moves back on to the clean sheet, and the foot part is made tidy. This amount of movement is often inadvisable, and to change the under sheet when the patient is unable to help himself requires two pairs of hands. The sheet having been well aired and warmed is rolled up from one side to half its width. The draw-sheet and mackintosh are loosened, and by them the patient is turned well over on his side, preferably the right side, and retained in that position by an assistant who holds firmly on to the draw-sheet and mackintosh. The nurse quickly removes all the pillows except that on which the patient's head rests, and folds back all the upper clothes to half their width over the patient, taking great care that he remains well covered all the time. She then untucks the dirty sheet, rolls it up lengthwise to the middle of the bed against the patient's back, and lays the rolled-up clean sheet alongside and parallel to it. The clean sheet is now tucked in and laid smoothly over that half of the bed, and the mackintosh taken from the assistant's hands and pinned in position. The patient is carefully turned first on his back and then on to his left side, passing in the process on to and then over the two rolls of sheets. He is now supported in this position by the nurse, while the assistant removes the dirty sheet, straightens out the clean sheet and fixes the mackintosh. In many cases, especially fractures of the bones of the leg and thigh and severe operations, it is quite impossible to roll a patient about in this way, and it is then necessary for the sheets to be gradually drawn under him from the top to the bottom of the bed ; the soiled sheet should be loosened from the top of the bed and rolled up as far as it is free, the clean one being rolled up parallel with it and its upper end tucked in. Two persons, one on each side, can now, by gradually raising first the shoulders, then the hips, and finally the feet, and rolling the sheets under each part in turn, remove the soiled sheet and put the clean one in its place without much exertion to the patient.

The *draw-sheet* (p. 344) should be changed as follows : Untuck both sides, roll one end up, and lay it alongside the patient, with one end of the clean draw-sheet rolled up and laid along parallel to it. The patient should then raise himself on his elbows and feet, the soiled draw-sheet be pushed away under him and the clean one introduced in its place.

Perhaps a simpler plan is to fix the clean draw-sheet with three or four safety-pins to the dirty one, and as the patient raises himself draw away the dirty one, and with it pull the clean one into its place, sufficiently far to tuck in. A helpless patient must be raised by an assistant during the process, and if he is too heavy to lift the method for changing the under sheet must be employed.

Lifting a Patient.

The lifting of a helpless patient in bed is always a difficult matter for untrained persons, and yet it is necessary to do so for many purposes. He must be raised up in bed that his pillows may be rearranged, that he may take his food or be made comfortable ; his position must be changed frequently to guard against bedsores, or he must be lifted to change his bed or to give him the pan.

A strong nurse may be able to lift him single-handed by passing her arms well underneath him, one under the knees, the other under the back below the shoulders, and many a trained nurse by long experience can do so without injuring herself by the strain ; but it is not a wise thing for an amateur nurse to attempt, as many severe affections may be produced by a strain in the awkward position necessary when stooping over the bed. Heavy patients may be raised or turned over from side to side by means of the draw-sheet, the nurse and her assistant standing on opposite sides of the bed.

The clothing of an invalid is a matter of importance. It should be warm and made of some woollen material, and should be changed frequently, whenever soiled or wetted by perspiration, with every care to avoid chill to the patient. When he can sit up in bed, the nightgown should be freed from under him, all fastenings undone, and the arm nearest the nurse slipped out of the sleeve; she then takes the clean nightgown, already aired, warmed and unfastened, and passes her arms downwards into it through the collar and front and out at the bottom, and afterwards upwards into the soiled nightgown through the bottom and up to the collar; she now pushes away the soiled one over the patient's head, and at the same time slips the clean one into its place.

The Patient's Clothing.

When the patient cannot sit up in bed, or the disease is accompanied with much pain on movement, it is a good plan to split the nightgown up the back as far as the collar, and sometimes the arms from the neck to the wrists. It is then only necessary to slip the collar over the head and fold the nightdress down each side against the body. The sleeves may also be provided at intervals with tapes, by which they can be fastened up. In affections of the chest which require poultices and dressings to be frequently applied it is a good plan to put on the pyjama coat back to front and leave all but the top button unfastened.

It is very refreshing to change the nightgown every night and morning, unless the disturbance is likely to do harm. A loose, woollen jacket should be at hand and put on when the patient sits up for his meals or is convalescent; it is more comfortable than a shawl thrown over the shoulders, which constantly tumbles off and gets wetted and dirty with the food. The jacket should have a pocket for the handkerchief, or this useful article will always be missing just when it is wanted. Woollen bed-socks are also a comfort to those who suffer from cold feet, and they may be long enough to come well up the legs.

The nurse must also attend to the ventilation of the sick-room (p. 351), and see that the proper temperature is maintained, taking the thermometer as a guide, and not her own feelings.

She must do her work in the sick-room with as little disturbance to the patient as possible, and must see that other people do not make a noise and disturb him either.

The nurse must also regulate the visits of friends, and she will find the doctor a great help in this rather delicate duty. She can carry out the doctor's orders without causing offence, and allow one visitor a day, or refuse all, as he has directed, and limit their visits, when allowed, to reasonable periods.

Visitors.

In most severe illnesses visitors do the patient decided harm. They excite and exhaust his strength, and seldom do him good, but during convalescence, and in slight or surgical cases, they may be a distinct help in the treatment by cheering him up and helping to pass the time and vary the monotony. The length of time visitors should be allowed to stay depends upon the patient's condition. They should never remain long enough to cause fatigue, and should on no account be allowed to take a share in the nursing, nor should they be present during meal times or during the hours when the patient would be sleeping. The afternoon is the best time for visitors. They should do the talking, and amuse and interest the invalid without expecting him to entertain them. They should sit by the side of the bed facing the patient, and not by his head, where he can only see them by straining himself round.

The Patient's Food.

The food should be given at regular intervals, and the time it is given and the amount should be recorded at once on the report. The nurse should superintend the serving of the meals, and be sure that they are arranged neatly, that everything is perfectly clean and as appetising as possible. It is often necessary for a nurse to prepare the food herself, especially such articles as Benger's Food, peptonised milk, and beef tea. For this reason she should have some knowledge of cookery, in which case she will find no difficulty if she follows the directions given in the recipes for invalid foods.

The meals should be served on a neatly arranged tray, covered with a clean table-napkin, and the glass and silver should be carefully polished, remembering that a very small thing will upset the invalid's fastidious appetite. A covered cup should be used for fluid foods, and a hot water plate with cover for meat and vegetables. When the patient must remain perfectly flat on his back a feeding cup must be employed. The diet and any stimulants are ordered by the doctor, who also decides the amount of the latter that should be given in the twenty-four hours. Stimulants should be administered at regular intervals, and should generally be mixed with the fluid food.

" Little and often " is the rule to be followed in the administration of food in sickness, for if the nourishment is given in large quantities at a time indigestion is likely to follow and cause much danger, for the exhaustion produced by the disease cannot then be made good, and the body wastes rapidly. Food should not be forced on the invalid, nor should he be consulted too much about it beforehand. The time for nourishment having arrived, it should be brought by the nurse, and when he has taken as much as he can the remainder should be at once removed from the room. Variety is a great help, and the patient's tastes and fancies should be considered as far as they agree with the doctor's orders.

Feeding by Injection.

Under certain conditions it is impossible to give food by the mouth on account either of incessant vomiting, or acute pain in the stomach, or obstruction of the gullet, or paralysis of the muscles closing the windpipe, and we have to resort to nutrient enemata, and give the patient all nourishment by the bowel. The rectum is not capable of digesting food, and can only absorb fluids when they are in a suitable condition. It is necessary, therefore, to predigest all nitrogenous and starchy foods, and to split up all fatty foods into an emulsion; that is, a very finely divided state. Milk, beef-tea, meat extracts, beaten-up eggs and gruel are used for this purpose, and should be prepared in the way described under "Peptonised Foods" (p. 336). The rectum is very easily irritated, and will then reject the enema as soon as introduced; each injection therefore should never exceed 4 ounces in amount, and must be administered with great care. Brandy is often added to the injections, but it is particularly liable to irritate the bowel. If the rectum rejects the fluid as soon as it is introduced, it is a good plan to wash it out with some lukewarm water an hour before the enema is to be given, or with half a teaspoonful of alum dissolved in 3 or 4 ounces of water; or the irritability may be relieved by adding 20 drops of laudanum to each injection.

Another means of feeding by the bowel is to give the nourishment in a very concentrated form made up into suppositories; these are to be obtained from chemists, containing either predigested meat or milk, and should be administered every three or four hours. After either an enema or a suppository has been given the patient should be directed to keep very still and avoid all straining, so as to retain them as long as possible.

The nurse has to take and keep a record of the patient's temperature, and to do so she must understand how to use the clinical thermometer.

The Patient's Temperature.

If this instrument is observed carefully, it will be seen that the stem is marked with a number of transverse lines, some of which are longer than the others. The longer lines represent the degrees, and the shorter (of which there are four between each pair of long ones) divide each degree into 5 parts. For the sake of convenience only every fifth degree is marked with its corresponding number—thus 95, 100, 105 and 110 are marked, and the four long lines between each of these are unmarked; those between 95 and 100 represent, of course, 96, 97, 98 and 99. At the second short line above the 98th degree is an arrow which marks the normal or natural temperature of the body, any appreciable rise above this representing a condition of fever. To read the thermometer it is necessary to note the point at which the top of the column of mercury in the stem rests. If this point is at the second short line above 98, the temperature is $98\frac{2}{5}$, but it is usual to record the temperature in decimals, and to describe this point as 98·4, or 98 and four-tenths.

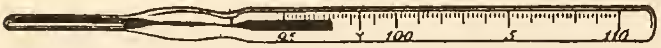


Fig. 91.—Clinical Thermometer with the Index a little below Normal.

A moderate-priced instrument should be chosen. The cheapest are inaccurate, unguaranteed, difficult to re-set and slow in action, but it is not necessary to buy the best. For choice a thermometer which takes sixty seconds to act and has a magnified index without other elaboration is the most suitable for the amateur nurse, and can be bought for from 2s. to 4s.

To take the temperature, first see that the upper end of the column of mercury (which is called " the index ") is well below the normal point; it can be lowered by holding the top of the stem between the finger and thumb and giving it a sharp shake, or by jerking the hand holding it against the other. The bulb (or part holding the mercury) is then placed in the mouth or armpit or the bowel and kept there for from thirty seconds to three minutes, according to the variety of instrument. It is then removed, the temperature observed, and a note made of it at once.

If the mouth temperature is taken, the thermometer should be put under the side of the tongue as far back as possible; it should be placed obliquely, with the other end in the opposite corner of the mouth; it must be left there for three minutes, unless the instrument is a rapid one, when the time necessary is marked on its stem. Whilst it is in the mouth the patient must breathe entirely through the nose with the lips closed, so that no cold air shall enter the mouth ; he must be directed not to talk, and not to hold the instrument with the teeth, but between the lips. It must not be placed between the cheek and the teeth, as in this situation the temperature is lowered by the external cold that passes through the cheek. The temperature thus taken records that of the interior of the body. The mouth, however, cannot be used under certain circumstances. A child will bite the thermometer or refuse to submit to the brief restraint ; there may be a constant cough or such shortness of breath that the mouth cannot be kept closed, or the teeth may be chattering, or there may be delirium. Again, if the mouth, throat, or neighbouring parts are inflamed, they are hotter than other parts of the body, and then only the local and not the body temperature is obtained ; inaccuracy also may arise from the patient having recently swallowed some hot food or drink.

To take the temperature in the armpit, the bulb of the thermometer must be placed between two surfaces of skin, and the arm held against the side of the chest for the necessary time. The objections to this method are that the skin is liable to have become chilled by exposure, that it takes a longer time to make a correct observation, that it is difficult to keep the skin in contact with the instrument, especially in thin people, that the thermometer is liable to slip from its position, and that in such painful diseases as rheumatic fever it involves too much movement.

The temperature may be taken in the bowel in patients of all ages, but the method is usually only employed in children. The child should be placed on his back on his mother's lap, the legs raised up, and the instrument inserted and held in position ; whilst the movements are restrained as much as possible.

Before being inserted in the mouth the thermometer should always be shaken down so that the index is *below* the normal, and should be carefully washed, and *cold* water should be used for the purpose. Much unnecessary alarm is sometimes caused by carelessness in these particulars. The thermometer may be properly shaken down, but if it is dipped into hot water before being placed in the mouth, the consequence will be that the temperature recorded is that of the water (perhaps 105°), and not that of the patient. Or the thermometer may have been left near a fire, and the patient's temperature may be taken without the index being shaken down. It is but necessary to know these possible sources of error to avoid them, but in cases of doubt the observation should be made a second time with proper precautions.

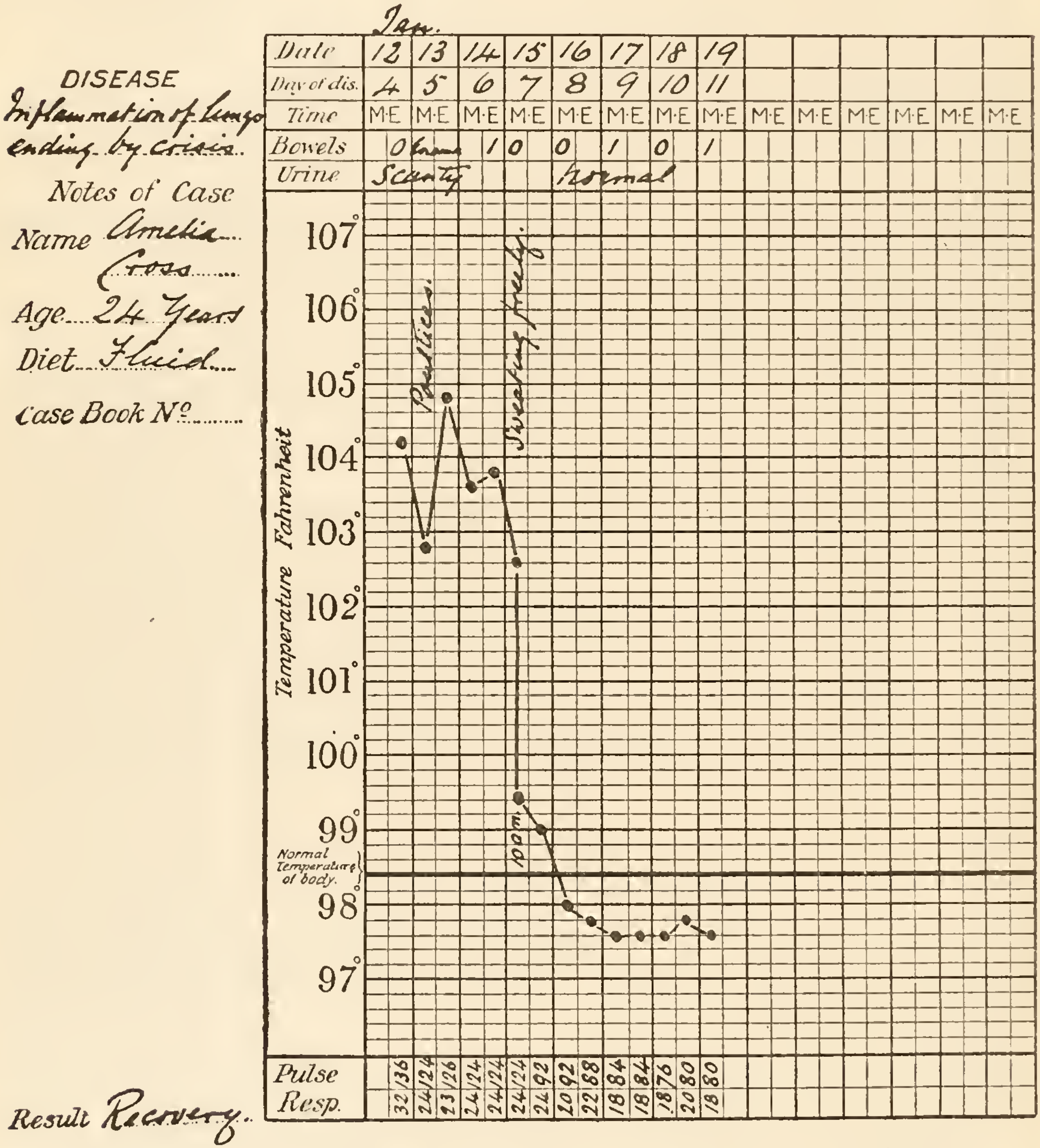


Fig. 92.—Temperature Chart of a Case of Inflammation of the Lungs.

During illness the nurse should take the temperature twice a day, the most convenient hours being between eight and nine in the morning, and the same time in the evening, but in severe attacks it is well to take it every four hours.

Temperature Charts.

The record of temperature must be carefully kept, and the best way to do this is to use one of the ordinary temperature charts, which can be obtained for 1s. or 1s. 6d. a dozen. These have transverse lines drawn upon them which correspond with the lines on the thermometer—thick lines to represent degrees, and thinner ones to represent their divisions; the temperature which these lines denote is placed in numbers at the edge of the chart, and it is easy to record the temperature on them by putting a dot at the spot on the chart which corresponds to it. It is customary to draw a line to connect the different dots with one another, and thus render it easy to read the course of the temperature at a glance.

The charts usually have columns provided for other observations, such as the pulse, respiration, actions of the bowels, and date (Fig. 92).

CHAPTER XLIII

THE UNPROFESSIONAL NURSE AND HER DUTIES (*continued*)

Nurse's Report—The Things to be Noted: Appetite and Thirst; the Tongue; the Pulse-rate; Fainting; the Breathing; Cough; Sleep; Pain; Convulsions; the Motions; the Urine; Perspiration—Posture—Bedsores—Administration of Medicines—Nursing at Night.

I.—THE NURSING OF ORDINARY CASES (*concluded*)

NURSE'S REPORT

A RECORD must be kept of all that occurs in the sick-room, and the keeping of the diary is an important part of the nurse's duties. This is shown to the doctor at each of his visits, giving him at a glance a correct idea of the progress of the disease, and saving a multitude of questions. It must include all particulars concerning food, medicines, the action of the bowels, the amount and time of sleep, and the patient's symptoms and sensations. Each item should be preceded by the time of its occurrence, and should be noted down immediately it occurs, and there must be no trusting to the memory, for even apparently unimportant items omitted through forgetfulness may involve serious consequences.

The following is a specimen :—

December 17

DAY REPORT

9	a.m.	Breakfast—small cupful of bread and milk.
9.30	,,	Loose action of bowels.
10.30	,,	Four ounces of beef-tea and small piece of toast.
11	,,	Medicine.
1	,,	Slept for 1½ hours from 11.30; perspired freely.
1.30	,,	Four ounces of Benger's food.
3	,,	Medicine.

Night Report

9.30	p.m.	Very restless, complaining of abdominal pain.
10	,,	Subcutaneous injection of morphia, ¼ grain.
2	,,	Slept quietly since 10.15.
2.15	,,	Eight ounces of Benger's food.
3.30	,,	One hour's restless sleep ; much cough.
3.45	,,	Medicine.

At the end of both day and night reports the total of food taken should be recorded, and the amount of sleep obtained, thus :—

Nourishment during day—2½ pints of milk, 1 pint of Benger's food, ½ pint of beef-tea, 2 ounces of brandy. 5 hours' sleep.

This will give a fair idea of how to keep the report, and of the items to be included. The temperature, respiration, and pulse are usually recorded on the chart (Fig. 92).

In order to make her report complete, the nurse has to observe all changes in the symptoms, and the way in which the various organs perform their duties. The symptoms connected with the digestive organs which must come under her notice are the appetite for food and drink, and the condition of the tongue ; the heart's action is best observed by watching the pulse ; that of the respiratory organs by the breathing and the presence of cough and expectoration ; and that of the nervous system by the sleep, mental condition and other matters. The excretions of the body—the motions and urine and perspiration—also require her attention.

We will now run over the most important points which should be particularly noted.

Appetite and Thirst.

The fact that the patient has any appetite for food is a guide in the choice of his diet, and its absence adds to the difficulty of maintaining his strength. Everything should be done by the nurse to encourage the desire for food, and tempt the appetite, and it is well to give the food desired unless it should be unsuitable.

The occurrence of thirst should be recorded, the amount of drink taken and the form in which it is most appreciated.

The nurse should mention if nausea is complained of, and especially if it follows any particular article of food, and also, if vomiting occurs, what length of time had elapsed since the last meal, as this may provide a definite indication that the diet must be changed or the amount of food lessened. Vomited matter should be removed immediately from the sick-room, covered up and reserved for the doctor's inspection; its appearance may help him in the diagnosis of the case.

When food is returned it may be digested or unchanged, or it may be mixed with blood mucous matter or watery fluid; it may be very acid or frothy from fermentation. Nurse should make a note of her observations.

The Tongue.

The condition of the tongue must be observed—whether it be clean or furred and dirty; whether the fur is white, yellow, brown or black; whether the tongue is moist or dry, red and sore, cracked or marked with indentations by the teeth. In fever it is moist or dry, thickly furred or red, according to the patient's condition; in diabetes it is red, dry, and shiny; in digestive disorders it is furred or irritable looking; in inflammation of the throat it is often swollen and furred; in "thrush" it is dotted over with small white spots like curds of milk; and often when milk only is being taken as nourishment it is white, though not furred, the so-called "milk tongue." Its condition should be described in the nurse's report.

The Pulse Rate.

Accurately counting the rate of the pulse is one of the nurse's duties. She must not only count the number of beats per minute, but she must observe, as far as her powers allow, any alterations in its strength or rhythm, and whether any definite effects follow the use of drugs, stimulants or baths. Wherever an artery lies near the surface of the body the pulse can be felt. The usual situation to make the observation is, of course, at the wrist, but it may be necessary to make it at the temple or in the neck. The artery at the wrist is situated at the front of the outer or thumb side, about 1 inch from its outer border, and 1 inch or so above the bend of the wrist joint, in which situation it can easily be felt even by a novice. The observation is made with the forefinger or the first and second fingers together, but never with the thumb. The fingers should press the artery firmly but lightly, and the beats are counted by the seconds hand of a watch for from ten seconds to half a minute, and the number then multiplied to give the number of pulsations per minute.

It is well to remember that many conditions besides disease alter the pulse rate ; exertion or movement, nervousness or fright will raise it to the rapidity of that of high fever. By the number of beats we know the rate at which the heart is working, and by the force of the beats the power it is exerting. The pulse is described as *full* when the artery appears to be dilated, and full of blood ; as *small* when the artery seems to strike but a small part of the fingers ; as *hard* if in spite of firm pressure the blood forces its way under the fingers, and *soft* when the pulsations are feeble and easily stopped by pressure.

It is *irregular* when the intervals between the beats are of different lengths, and *intermittent* when a beat is occasionally absent altogether. Many of these characters can be well recognised by an amateur nurse, and a record of each should appear in her notes.

Fainting.

In heart disease, after severe hæmorrhage, and in the extreme debility that often occurs in the early stages of convalescence from severe illness, there is a liability for the patient to be attacked with faintness, and the nurse should know the proper measures to adopt. The patient should be laid down perfectly flat, all tight clothing should be loosened, and, if he can drink, a teaspoonful of sal volatile with water, or some spirit and water, should be given him, whilst cold water should be sprinkled on his face and chest. Smelling salts also are useful. The nurse should notice if his face remains natural, becomes pale or dusky, and whether he loses consciousness.

The Breathing.

The patient's breathing must be kept under the observation of the nurse, and noted in the report. A healthy adult breathes from sixteen to twenty times a minute, and children much faster, and the rate is increased by nervousness and exertion as well as by disease. Respiration is best observed by laying the hand quietly, and without attracting the patient's attention to the fact, upon the abdomen if the patient be a man, and upon the upper part of the chest if a woman (for these are the parts which move most freely), and then counting the number of breaths which are drawn in a minute. The record should be placed on the temperature chart (Fig. 92, p. 366) by the side of the pulse rate, in order that the numbers may be compared. In health, as we have explained in an earlier chapter, there are four pulse beats to each respiration. If the pulse rate is increased out of that proportion the heart is at fault, and if the respirations are unusually rapid some affection of the lungs is to be suspected.

The character of the breathing also should be noted, whether it is easy and regular, jerky, restrained, painful, shallow or noisy.

Cough.

The nurse should be careful to note the occurrence of cough, for its first appearance in the course of an illness may be a matter of great importance, and indicate some implication of the respiratory organs, which have previously been unaffected. The time of its appearance should be noted, and whether it is frequent or painful (and if so where the pain is felt), whether also it is worse at any particular time, as at night or in the morning on waking from sleep, or after taking food. The character of cough also varies in different complaints. It may be violent, occur in paroxysms, be constant and hacking, be tight or loose—that is, dry or accompanied with expectoration. It may also be hoarse, noisy, whooping or "croupy."

Again, when expectoration occurs its character should be noted, and whenever possible a specimen should be reserved for the doctor's inspection. Some definite statement should be made as to the amount—whether it is free or scanty; as to its nature—whether frothy, sticky or thick; and as to its colour, whether yellow, white or blood-stained. We have elsewhere explained that the character of the expectoration varies in different disorders, and in some cases is a guide not only to the nature of the affection, but also to its various stages. If the expectoration has a peculiar or offensive smell, that also may be a point of importance.

Sleep.

The doctor is sure to want to know what sleep the patient gets, and the nurse must write down the amount he has had each time he awakes, add up the total in the morning, and note the longest sleep. She must also report what sort of a night he has had—if it was quiet and restful, or disturbed and restless, if there was any tendency to delirium, if he woke frightened, and if he made any complaint of pain. Delirium is liable to occur at the time of waking from sleep, and although not necessarily important it should not be overlooked; the form that delirium takes may vary, and note should be made of it.

Pain.

The observations regarding pain must include its variety, whether sharp, shooting, dull or aching, heavy or throbbing; also its situation and duration, and the effects on it of remedies. Convulsions are anxious complications of many disorders, and a nurse may be alone with her patient when he happens to be attacked. It is well, therefore, that she should know what to do, and what to observe. Her chief care should be to prevent him from hurting himself. She should restrain the movements just sufficiently to prevent bruising or injury against hard objects, she should undo anything tight round the throat and waist, and place a cork or a piece of wood—with a piece of string attached in case it should slip—or the rolled-up corner of a towel between his teeth to prevent him from biting his tongue, and lay him down on the bed or floor.

Convulsions.

Whilst carrying out these measures she should note where the movements begin, what part of the body is involved, whether consciousness is lost, and if the face grows dusky and blue, or the patient utters a cry.

The Motions.

The occurrence of every action of the bowels should be jotted down in the report at once, and the condition of the motions—whether they are loose or constipated, whether they consist of lumps or fluid, are natural in colour or are pale, black or green, contain mucus or blood, undigested food or curds of milk. If anything is unusual in their appearance they should be taken out of the room, covered up, but not mixed with disinfectants, until the medical man has seen them.

The Urine.

By examining the urine the action of the kidneys can be gauged. In ordinary circumstances of life and diet the kidneys secrete 50 ounces of urine in the twenty-four hours, and in many cases it is important to measure all that is passed, and note it down, guessing the amount passed with the stools, and adding up the quantity for the day and night. If the patient drinks little the urine will be small in quantity, and in certain diseases it is very scanty. In other diseases it is excessive in quantity, as for instance in diabetes and some cases of chronic inflammation of the kidney.

The nurse must note, besides the general amount, whether the water is passed frequently or seldom, easily or with pain or difficulty ; whether it is clear or thick, thickens on cooling, is pale or dark in colour, contains mucus, blood or matter, and any other peculiarity. She must remember that blood, except in large quantity, does not make the urine red, but cloudy, and like beef-tea in appearance.

The more active the skin, and the greater the amount of sweat, the smaller will be the quantity of urine, and *vice versâ.* Nurse must note if perspiration occurs, and if it is slight or free ; the time it occurs, the part of the body it affects, and if it has any peculiarity of smell. In some diseases sweats are common, and form a symptom of the complaint as in consumption, rheumatic fever and blood poisoning. In the first they often occur during sleep, in the second they have a peculiar sour smell, and in many severe feverish complaints they occur at the time of the crisis, and are of most hopeful augury, being accompanied by rapid fall of temperature.

Perspiration.

Again, perspiration may be the result of treatment, and much anxiety is often felt until the measures employed produce the required result. The nurse must, therefore, watch the effects carefully, and may have to be guided by these in the administration of medicines and the use of external remedies. She must take great care to protect the patient from chill whilst wet with sweat, and change his clothes with due precautions as soon as the perspiration ceases. Occasionally free sweating produces a skin eruption, formed of many minute blisters; though these are not serious the nurse should record their appearance.

Such are the things which a nurse should take note of in her daily report.

Posture.

The position that a patient assumes in bed is a matter of interest, as from the posture much may be learnt. In many diseases of the heart and respiratory organs there is extreme difficulty of breathing, and the recumbent position cannot be assumed with comfort; the patient has to sit up in bed or in a chair night and day. Pain also affects the patient's attitude; in peritonitis pain in the abdomen is extreme, and the invalid lies on his back with his legs drawn up and his shoulders bent forward; in pleurisy it may be impossible for him to lie on the affected side, as the pressure increases the pain; and in heart disease he often cannot lie on the left side. In extreme prostration and debility the patient sinks down in the bed from pure helplessness.

Bedsores.

The prevention of bedsores is one of the nurse's most urgent duties. These sores are the result of pressure, which interferes with the circulation through the skin of the part, and they form one of the most troublesome complications which are likely to occur in illness. The first thought which occurs to everyone when a bedsore is seen is that it is the result of bad and inefficient nursing, and it is quite true that in many cases the nurse is to blame, and that with greater care the trouble might have been prevented. But it is not true that bedsores are always the nurse's fault, for sometimes in long illnesses accompanied with extreme prostration the most unremitting care, the most constant attention are unable to ward off the trouble. The sores form on any part of the body where pressure is applied, the most common being the lowest part of the spine or sacrum, the buttocks, heels, projecting part of the thigh bones, and shoulder blades.

" Prevention is better than cure," and the nurse should in all cases carefully examine the patient daily to be sure that no sign of a bedsore exists. The first signs are a sensation of discomfort in the part, as if the bed was unusually hard on the spot, or as if something rough—a bread-crumb or a creased sheet—were hurting it; there is a sensation of pricking and numbness, and on examination the skin is found to be red, tender and roughened. Unless treatment is successful the redness spreads, the skin gets dark, the pain grows worse, and the patch of affected skin dies and separates, leaving a sore which discharges an unhealthy watery fluid, and the wound thus formed grows rapidly larger and deeper. Bedsores form with great rapidity in those who are very prostrate, and especially in the paralysed, who have no sensations to guide the nurse. They are caused by bad nursing, when the skin has been unattended to, and allowed to remain soaked in urine and discharge; when it has not been kept clean and protected from pressure, and the irritation of crumbs, solid particles and creases. The feather bed also is a fruitful source of this trouble.

The *treatment* is at first preventive, and later, when sores have formed, is palliative and curative.

The nurse should daily examine the parts subjected to pressure, and should wash them with soap and water. Having thoroughly dried them, she should rub them gently with a small piece of cotton-wool, soaked with eau-de-cologne, methylated spirit, whisky, or other spirit, until it has quite dried in, and she should then well dust them over with a powder of equal parts of starch and oxide of zinc. If the parts are likely to become wetted, some boracic acid ointment is perhaps better than powder. Added to this local treatment, most careful nursing is necessary. There must be absolute cleanliness, the bedclothes must be changed at once if soiled or wetted by perspiration, discharges, or excretions. The patient must be most carefully washed, and after every action of the bowels the parts must be sponged with warm water and dried thoroughly. In those cases in which there is a loss of power over the water or motions some plan must be adopted to prevent the skin from remaining wet and dirty: a urinal, a sponge or cotton-wool must be placed so as to catch the excreta, and it should be changed frequently. Again, the under sheet and blanket must be kept smooth and free from creases, and all bread-crumbs and rough substances removed at once when complained of by the patient. The position of the body should be frequently changed, so that no particular portion of the skin bears the weight for long at a time. Much comfort will be obtained by the use of water or air cushions and beds, a very useful form being the smaller cushions with a circular central hole by which the part can be relieved from all pressure (Fig. 75, p. 346).

But if a bedsore forms we must use other treatment in addition to the foregoing. When it is very small it may be painted over with a coating of collodion; if larger it must be washed two or three times a day with boracic acid lotion, carefully dried, and a small piece of lint, the size of the wound, smeared with zinc ointment, should be fixed over the sore with plaster. Over this a piece of thick felt or gamgee tissue (both of which can be bought at the chemist's), with a hole cut in it, should be placed as a protection from pressure. If a piece of skin has mortified and turned black, it will have to separate from the living skin before the wound can heal. The separation can be hastened by a bread poultice or compress made of boracic lint wetted with hot water, and the resulting raw surface can be healed by ointments of resin or zinc and lotions of compound tincture of benzoin, balsam of Peru, or red wash.

Administration of Medicines.

The nurse's duty includes the administration of the medicines ordered by the doctor, and as the taking of medicine is looked upon by most patients as a disagreeable task, it is the sign of a good nurse to make as little of the business as possible, and give the dose at its proper time as a part of the regular routine. It is essential *always to read the directions on the bottle*, and thus to be sure no mistake is made, for some of the most serious accidents have occurred through carelessness in this matter. It is well also to give the bottle a shake before pouring out each dose, as some drugs have a way of settling down at the bottom of the bottle and if not well mixed a stronger dose remains for the last. This is of particular importance in those medicines which have a sediment or which contain insoluble powders, suspended in a thick fluid.

Medicines are ordered to be given at different times, most commonly three times a day, and the best hours would then be at 10 a.m., 2 p.m. and 6 p.m.

If ordered every four hours, 8 a.m., 12 noon, 4 p.m., and 8 p.m. would be the hours, and no medicine in the night unless expressly ordered. If the dose is ordered every two hours it should be given in the night as well as in the day. But it would be well always to ask the doctor if the medicine is to be given in the night, and if the patient is to be wakened for it or for the food; it is much more common for food to be necessary at night than medicine.

A medicine ordered "at bedtime" should be given about 10 p.m., or the time at which the patient settles down to sleep; "before meals" may be taken to mean twenty minutes before; "after meals," about half an hour after.

Although medicines are put up in a different sort of bottle from medicaments for external application, some most lamentable accidents have occurred through poisonous liniments being swallowed in mistake for medicine, and the nurse must be always on her guard against such unaccountable mishaps. If such occur, she should at once call for help, send for the doctor, and refer to the section on poisons and their antidotes.

Nursing at Night.

The nurse who has to take charge of the patient at night should see that she has ready at hand everything that is likely to be wanted. She will require sufficient coal to keep the fire burning until the morning, a candle, lamp or night-light, matches, and a kettle on the hob. The food for the patient and herself should be prepared and placed ready on a table, with the necessary apparatus for warming it up if this is desirable. The less light there is in the sick-room the better, but through long night watches it is very difficult for the nurse to keep awake unless she occupies herself with needlework or reading. For this she will require a light, but great care should be taken that it is carefully shaded from the patient's eyes, and that there are no reflections of it which may disturb him. A shaded lamp, candle or night-light should be arranged on the nurse's table behind a screen. A very useful appliance is a good-sized night-light, over which a small saucepan can be placed to keep the invalid's food warm.

As night approaches, everything should be done to get the patient into a quiet frame of mind. He should not be allowed to see any visitors in the evening, nor discuss anything likely to excite or disturb him.

The nurse should, of course, be as quiet as possible, but it is not well for her to creep about the room, nor discuss matters with others in a whisper ; slight and ordinary sounds do not disturb or awaken people, and if the patient has gone to sleep with these occurring around him he will not be disturbed by their continuance.

It is seldom necessary to wake a patient at night, but if it must be done, he should not be aroused sharply or suddenly. If he is in a very prostrate condition, it may be necessary to give both food and medicines, and the express orders of the doctor should be obtained on this point. The nourishment and medicines should usually be given as near the proper hours as possible, whenever the patient wakes. The early morning is the time when special attention is necessary, for it is then that the patient is likely to be at his worst, and that food and stimulants are most likely to be required. It is also the coldest part of the night, and it may be necessary for the nurse to make up the fire, place more clothes on the bed, and close the window ; but the window should be open all night if possible, for though night air is colder than day air, it is otherwise no more dangerous.

It is well that the nurse should be provided with many expedients to soothe and comfort a sleepless patient. His position must be altered, and his bed and pillows made as comfortable as possible ; he may be given a little warm food or drink ; his face and hands may be sponged over with warm water ; his limbs and back may be gently rubbed, and the rubbing continued for some time after the desired effect has apparently been obtained, or he may wake again. Reading aloud also in a quiet and somewhat monotonous voice may be helpful ; it distracts the thoughts and often acts as a soporific.

After a restless night the patient should be allowed to sleep well on into the morning, and the nurse must be careful to shut out stray rays of early sunlight with carefully drawn curtains, and check unnecessary noises in the house near the sick-room. Sleeping draughts are to be avoided whenever possible, but at times they must be looked upon as a necessary evil, and as the only means of preventing worse evils caused by want of rest. As a rule a sleeping draught is ordered to be given at bedtime, and it is important that all the necessary arrangements for the night should have been completed, the patient washed, fed, and made comfortable before it is administered. After the dose silence should reign supreme in the sick-room, or sleep will be wooed in vain,

CHAPTER XLIV

THE UNPROFESSIONAL NURSE AND HER DUTIES *(concluded)*

The Sick-room—Nurse's Health—Spread of Infection—Accident Cases—Preparing the Room—Treatment of the Injured Person—Dressing the Wound—Setting a Broken Bone—Preparing for an Operation—Requisites for the Operation—After-effects.

II.—The Nursing of Infectious Diseases

Whenever possible the sick-room in cases of infectious illness should be at the top of the house, and no one but the nurse and her assistant should be allowed to occupy a room on the same floor. The nurse ought never to sleep in the sick-room, and it is a great advantage for her to have a third room, however small it may be, where she can carry out disinfection and washing. The top of the house is chosen as it is much easier to isolate ; disease germs are less likely to spread, and other members of the household need not pass near the room. The sick-room should be cleared of all unnecessary articles of furniture, nothing being left that will not be of use ; all woollen articles should be removed, such as curtains, hangings, carpets, and clothing ; oilcloth, cork carpet, or Indian matting may be laid on the floor, and lace or muslin curtains may be used to brighten up the room, which should be made as pleasant as possible, for the patient has to go through a period of confinement which is very irksome to bear. Isolation must be very strictly enforced ; no one should be allowed to enter the room except those who are engaged in the nursing.

Nurse's Health.

The nurse's dresses should be of washing material, and should always be changed before she mixes with others ; she should keep separate all clothing which she wears out of doors ; she should take a bath whenever possible before leaving the house, or at the least wash her hands and face with disinfectants. She should also give attention to her own health. She should never eat or drink in the sick-room ; infection may be introduced by the mouth, and may be swallowed with the saliva; this may be avoided by frequently washing out the mouth with some antiseptic such as equal parts of Sanitas and water. She should avoid also overwork from too long hours, should take an hour's walk daily, and have a night of at least seven hours' sleep.

To prevent the infection from spreading to other parts of the house is also the nurse's duty. She should nail over the outside of the door a large sheet so as completely to cover it, and should keep this constantly wet with disinfectant, its lower corner on the hinge side should hang in a basin full of the same disinfectant, which will assist in keeping it damp. A large clothes-horse covered with a similarly wetted sheet may be used outside the room to cut off the staircase from infection. The floor of the room and of the landing outside should be well sprinkled with antiseptic, and a good plan is to keep a small watering-pot for the purpose, and use it several times a day, whenever the floor becomes dry. All plates and cups and everything used in the sick-room should be dipped in lotion before being put outside, and letters should be well baked before being posted.

Spread of Infection.

Apart from the general means of dissemination of infectious disease, which are dealt with in another part of this work, there are certain modes of transmission peculiar to certain diseases, and it is well that those who are nursing the sick should be aware of them, as special measures have to be taken to guard against them. Cholera and enteric fever are transmitted entirely by the presence of poison in the evacuations of the bowels, and if these are properly and efficiently disinfected the spread of the disease is prevented. Syphilis, hydrophobia, and many forms of blood poisoning are introduced by direct inoculation of a wound, and smallpox and cowpox are sometimes transmitted in a similar way. In most infectious disorders the poison is given off from the body of the affected person in the breath, the excretions and the secretions, and is conveyed to healthy persons by the air or by articles of clothing or bedclothes. The infective particles in smallpox and scarlet fever have the most wonderful vitality, and have been known to cling to clothing and other articles for many months, and if these are again used without disinfection they will be the cause of fresh outbreaks of disease. The term "fomites" has been given to articles capable of holding infection in this way; and with proper precautions this method of diffusion can be entirely prevented. The smallpox poison is present in the discharge and scales from the spots; that of scarlet fever chiefly in the scales that peel from the skin; that of whooping cough, diphtheria, and measles, in the breath.

III.—Nursing of Surgical Cases

Surgical cases can be divided into two classes, those which are the result of accident and those that are caused by operation. In the more simple cases of both classes the nursing is often entrusted to the hands of friends or servants of the patient, but in severe cases this is out of the question, for surgical cases of any magnitude require as careful and skilled nursing as the most dangerous illness.

However, in the milder cases, the patient does not feel ill at all, and if the necessary dressing of wounds and rearranging of bandages and splints is carried out by the doctor at his visits, the general management can be easily undertaken by the amateur nurse. The patient may be confined to his bed but requires only to be waited on, and his ennui relieved by pleasant and cheerful society and amusement. Absolute cleanliness in everything is of first importance, and complete rest of the injured part is also necessary.

Accident Cases.

It is important that everyone should know what is likely to be wanted when an accident occurs and what preparations should be made when information is received that an injured person is being brought home. The nature of the injury will of course be a guide as to what preparations are necessary, but the first question to decide will be as to the room in which the injured person shall be placed. This having been chosen it should at once be made ready to receive the injured person. The bed should be so placed that either side is easy of access. The mattress must be looked to, it must be firm and comfortable; a feather bed is quite unsuitable for all surgical cases. A draw-sheet should be arranged with a mackintosh under it, for it is more than likely that when once settled the patient may be unable or forbidden to move for days. The fire should be lighted, a kettle put on to boil, and hot bottles and hot blankets placed ready at hand. As the patient's clothes may be dirty, or he may have a wound which will bleed, some preparation must be made to avoid soiling the furniture and carpet, and probably an old sheet or some newspapers would be suitable for the purpose and should be spread out on the floor, or on a sofa or table.

The room being now ready, the way to it should be cleared of obstruction, all pieces of furniture should be moved from the hall, and loose mats or pieces of carpet on which the bearers might stumble.

Treatment of the Injured Person.

The patient having arrived, he must be undressed and put to bed, and whilst this is being done the greatest care must be taken to avoid aggravating the injury; it is a good plan to entrust the care of the injured part to some individual who must make it his entire duty. The undressing must be carried out very gently, and the clothes had far better be sacrificed than any risk run. In removing the coat, always take off the sleeve on the uninjured side first, and in putting on fresh clothing first put the injured arm into the sleeve; in this way the amount of movement will be reduced to a minimum. In removing the trousers it is best to rip up the outside seam on the injured side, and the socks and boots must be cut open rather than dragged off by force.

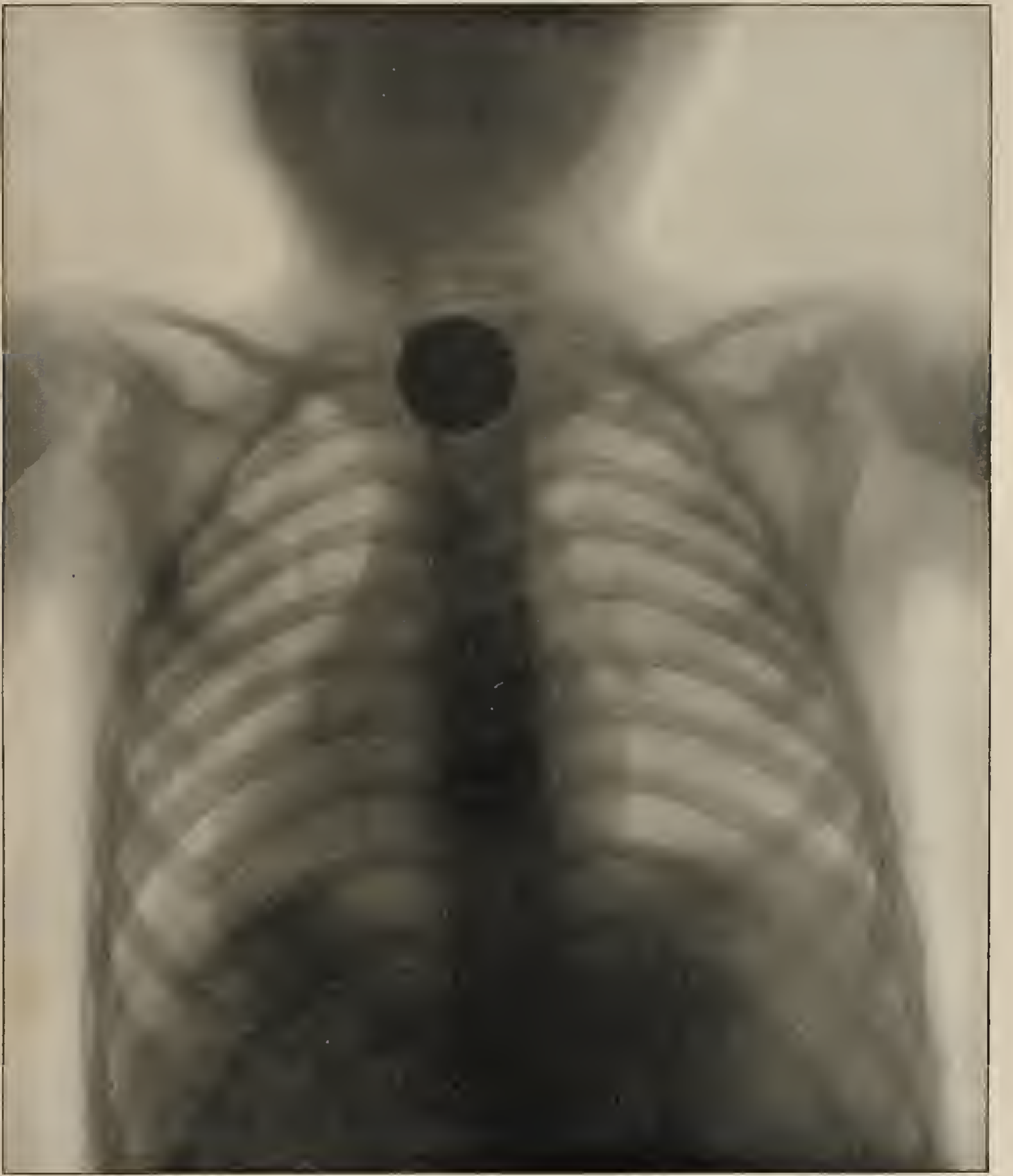
In burns and scalds as great care is required in removing the clothes as with broken bones and wounds, for if they are taken off carelessly the blistered skin is liable to be dragged away with the clothing, and the injury and suffering much increased. The clothing that has stuck to the burnt skin should be cut free and left on the wound, and soaked with olive oil, so that it may be softened and easily separated when the surgeon arrives.

Dressing the Wound.

When the doctor comes he will have to wash the wound and apply a dressing to it. It will therefore be well to have the necessary things in readiness, such as a couple of basins, clean towels, hot and cold water, some antiseptic (carbolic acid being most commonly employed), lint, cotton-wool and bandages. Very hot water is useful for checking hæmorrhage, and stimulants may be required in case of faintness.

Setting a Broken Bone.

If a bone has to be set the surgeon will require a splint, bandages, and cotton-wool; the first he will provide himself, as its shape and variety depend on the part injured, but it may be necessary for the nurse to put a padding on it in a hurry. Pads for splints are made of two pieces of linen or other material cut the shape of the splint, and stitched together along their edges; these are filled with cotton-wool, tow or other suitable substance. An



From a Radiograph by W. A. Coldwell, Mandeville Place, W.

A HALFPENNY IN THE THROAT, AS SHOWN BY X-RAYS.

excellent padding can be made with gamgee tissue, which can be bought at the chemist's, and consists of two pieces of gauze with a thick layer of cotton-wool between them. The padding is fixed to the splint with a lacing of strong thread across the back, and must be wide enough amply to cover the edges of the splint.

It will only be necessary to consider the preparations for the slighter operations, when the friends of the patient may undertake the duties; in severe operations a trained nurse will be obtained, and will undertake the responsibility. The room should be thoroughly turned out and cleaned, and all superfluous furniture and hangings that will catch the dust should be removed. For major operations the carpets also must be taken away. A screen should be placed round the patient so that he cannot see all the preparations, or he may be allowed to lie in another room until everything is ready.

Preparing for an Operation.

The day before the operation give ½ ounce of castor oil, the hour depending upon the time of the operation. On the day of the operation give a soap and water enema the first thing in the morning.

If chloroform or ether is to be administered it is very important that the patient should be thoroughly hungry at the time of the operation, for patients with food in their stomachs always take anæsthetics badly, and are almost certain to be troubled with severe vomiting. No solid food should be taken for at least six hours before the operation commences, but a small quantity of beef-tea, beef essence and brandy may be allowed a few hours previously.

The patient should have a hot bath, the hair should be shaved off the part to be operated on, and, if a woman, the hair should be well brushed and secured in two firm plaits, as it may be some days before it can be done properly again. The skin all around the seat of operation should be well scrubbed with soap and water, and it is well to use ether soap, as it removes all the grease. Clean off the soap with cotton-wool and biniodide of mercury lotion (made by dissolving one of the tabloids in 1 quart of water), and if ether soap has not been used, rub well with cotton-wool soaked in ether.

Now cover the part with a double piece of lint soaked in a 1 in 40 carbolic lotion (2 drachms of carbolic acid to ½ pint of warm water), cover with oil-silk, and keep in position with a bandage until the operation.

As soon as the operation is over, the patient is lifted into bed, covered with warm blankets, and hot bottles are placed to his feet and body.

Treatment after Operation.

Before the surgeon leaves he will show signs of returning consciousness, and perhaps be able to speak a few words; he should then be allowed to go to sleep, and be left undisturbed until the effects have passed off, and on no account be worried by the nurse or his friends trying to rouse him and getting him to answer questions. He should be given nothing by the mouth for a couple of hours. If he is treated in this way vomiting may be altogether avoided, but the sickness after anæsthetics is one of their most frequent and most unpleasant effects.

The first thing to be given by the mouth is a teaspoonful or two of hot water, then a tablespoonful, and if this is retained a little very weak hot tea, with a few drops of milk in it. After this small quantities of milk and water, beef-tea, or brandy and water. Nourishment may then be given in larger quantities, but as a rule no solid food for twenty-four hours.

If vomiting persists, small pieces of ice may be sucked, and the patient kept absolutely at rest, and fed frequently, but in very small quantities, out of a "feeder." The smell and taste of ether are very disagreeable, and cling about the patient and the room for a long time; washing out the mouth with hot water helps to dissipate the taste, and a good fire aids in changing the air of the room. Faintness should be treated by keeping the patient absolutely still with his head low, by placing hot bottles around his body and, if he can swallow, by giving a small quantity of brandy and water. Hæmorrhage also must be looked for, as it may be the cause of the faintness, and the nurse should at regular intervals examine the lower parts of the dressings to see that they are quite dry, and not stained with blood. If the breathing fails, the doctor should be sent for at once, and artificial respiration employed until he comes.

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